AD Issue

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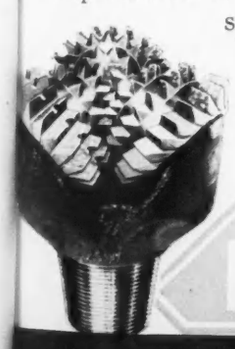
The OIL WEEKLY

FOR THE DRILLING, PRODUCING, PIPE LINE INDUSTRY

Connoisseur!

"Calling a driller a connoisseur seems a bit fancy since the word usually applies to the fine arts. But drilling *is* a fine art and since connoisseur means 'a trained and competent judge', it describes perfectly an experienced driller's know-how in appraising specialized oil field drilling equipment. Hughes TRI-CONE Rock Bits are the masterpieces of the drilling industry in every formation on every location. Making maximum footage, fast, straight, full-gage hole in minimum time is mighty important to me, and Hughes Rock Bits always give superior performance on all counts."



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CENTS PER COPY November 25, 1946 VOLUME 123, NUMBER 13

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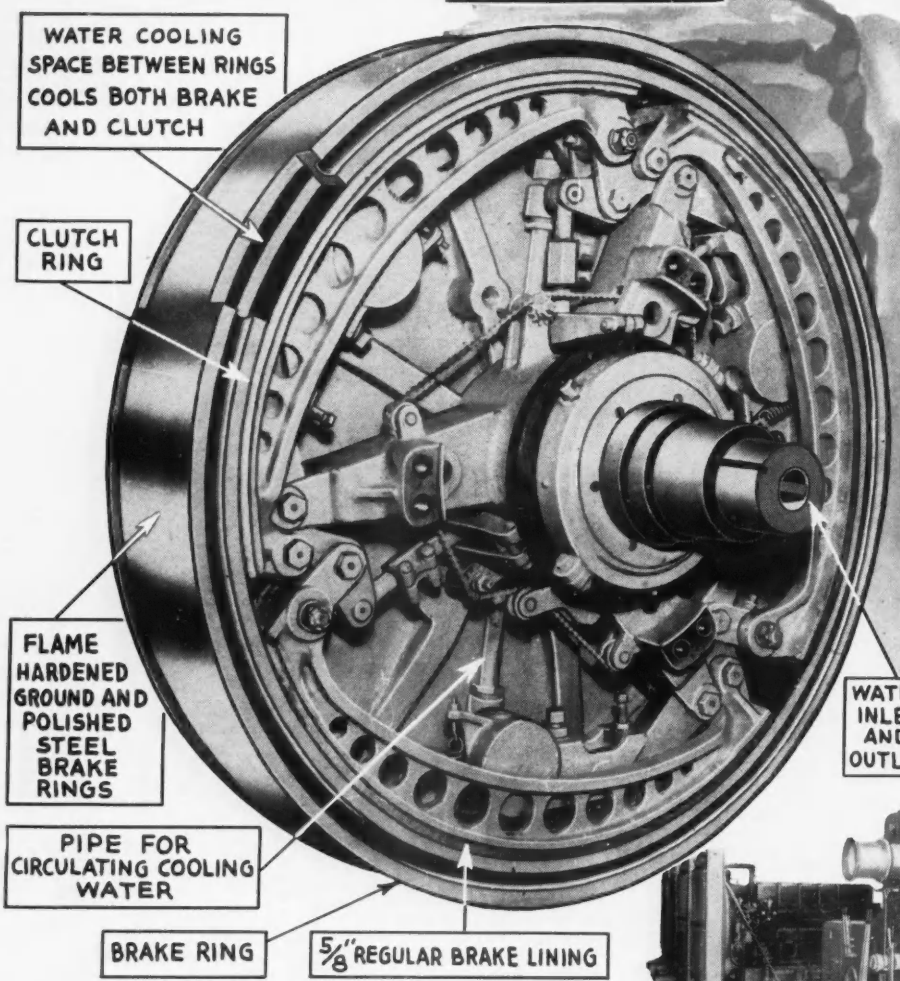
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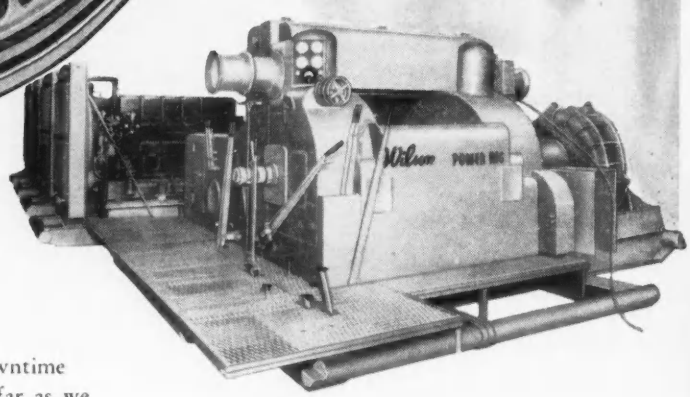

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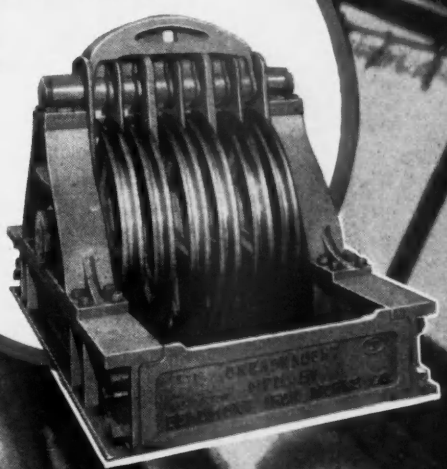

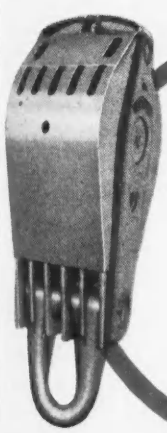

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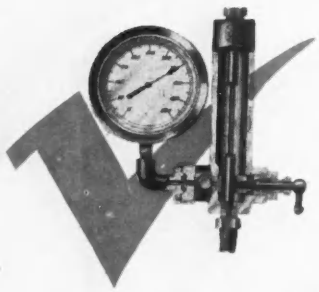

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Looking Ahead

WITH THE EDITOR

ON HIS recent trip to Europe as a special representative of THE OIL WEEKLY, Dr. J. Brian Eby, Houston consulting geologist, spent a week in Italy visiting the oil fields and general offices of several operating companies.

Dr. Eby reports that the petroleum situation in Italy is basically associated with the political and economic life of the country. As soon as the political situation clears, several American oil companies likely will enter the Po Valley with reflection and other geophysical research methods and a lively exploration program may be expected.

In the revival of the oil industry of Italy, it is proposed to reactivate at once several of the large refineries, all of which were damaged or destroyed during the war. Many of these plants were owned by American firms.

A discussion of the petroleum situation in Italy is given by Dr. Eby in "Italy's Production Program Lies Ahead," to appear in the monthly international feature section, December 2 issue.

Also scheduled for the international section is a report on the petroleum possibilities of the Gaspé Peninsula in Canada by Fred W. Bates and Robert R. Coleman, Jr., consulting petroleum geologists and engineers of Lafayette, La.

M. A. Noguera of the Cuban Oil Enterprises, Havana, will give a report on the Jarahueca field in Cuba, which is operated by several independent producers.

Among articles in the regular section of the issue will be Part 5 of Hubert Guyod's series on "Temperature Well Logging"; Part 13 of C. L. Hightower's "Fundamentals of Industrial Accident Prevention," and a report by Gilbert M. Wilson, staff writer, on the use of diamond core bits in Colorado.

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PETROLEUM REFINER and The REFINERY CATALOG for the refining-natural gasoline industry

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The OIL WEEKLY

ENGINEERING NEWS STATISTICS

R. L. DUDLEY, President, Publisher A. L. BURNS, General Manager

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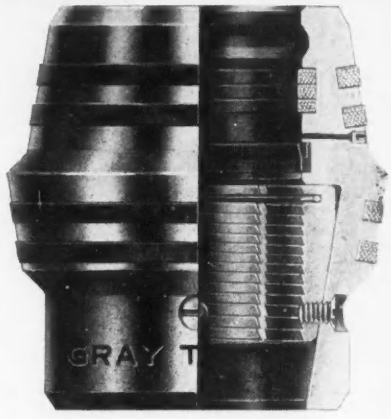
The GRAY ROLLED SEAL CASING HANGER



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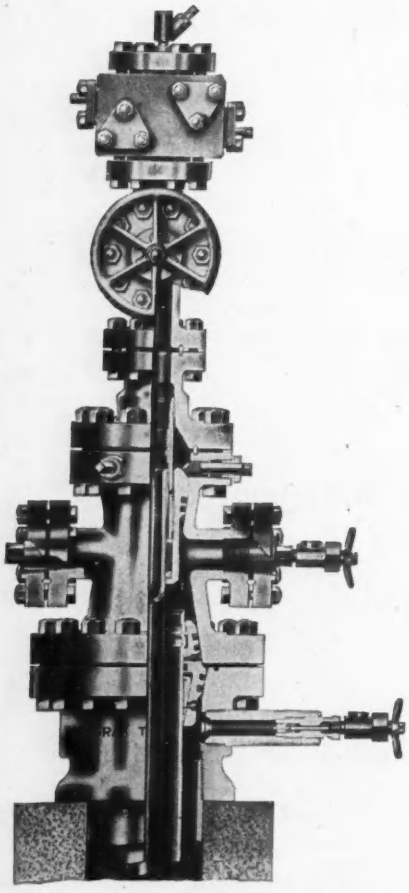

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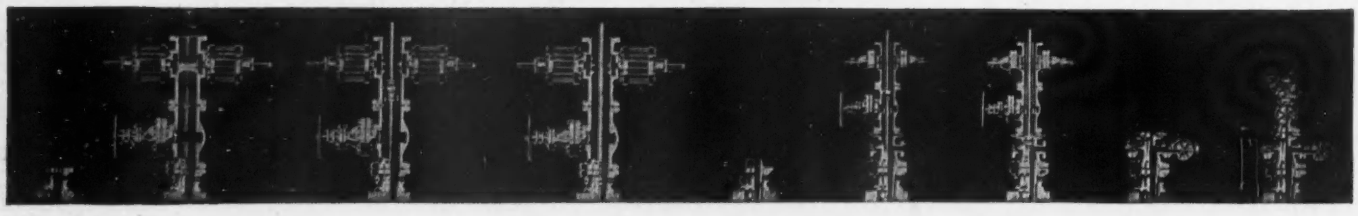
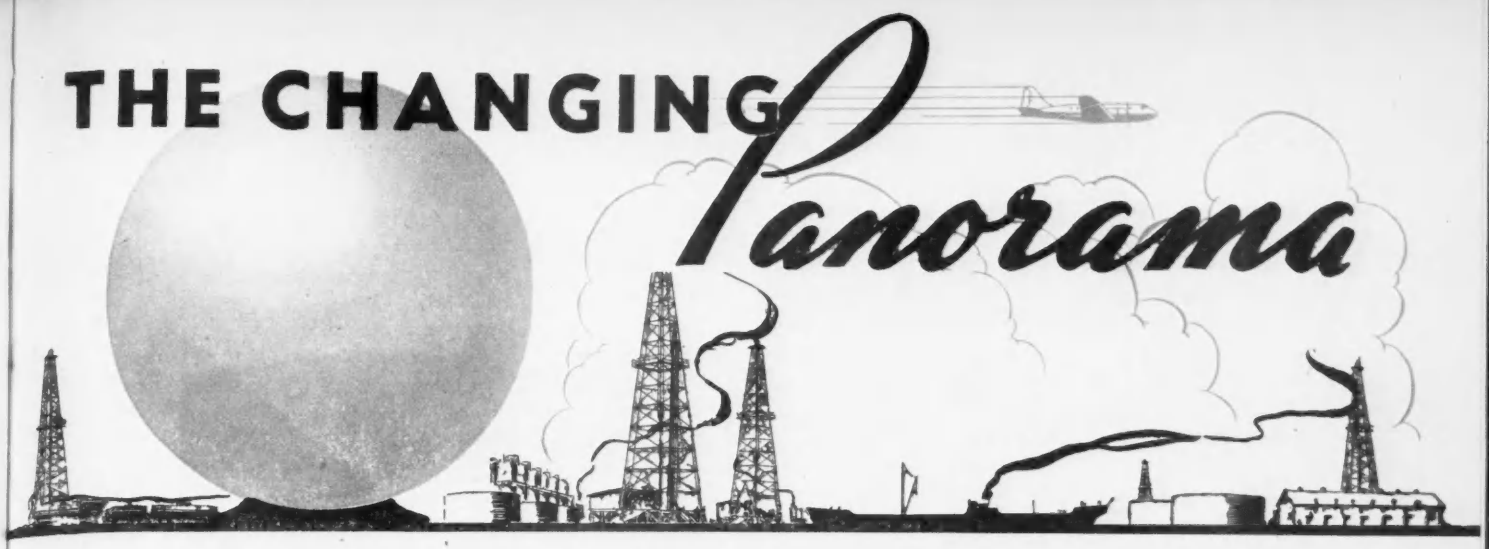


Casing Head Attached | Drilling | Running Casing | Casing Landed | Drilling Control Equipment Removed | Drilling-in and Running Tubing | Tubing Landed | Control Equipment Removed | Manifold Attached

THE CHANGING Panorama



Good Theme for Oil's Public Relations Plan

THE petroleum industry's program of education, discussed in detail at the annual meeting of the American Petroleum Institute, is a start in the right direction toward erasing the "colossal shortage of understanding about the oil industry." The plan, as set forth, is one that deserves wholehearted support, which doubtless it will get, from the companies, large and small, which go to make up the working units of the big, sprawling industry that is tagged "oil."

That the field is wide open for such an undertaking was established by the survey made for API by Opinion Research Corporation. This nationwide check came up with the startling information that the general public knows more about three other industries—automobiles, railroads and coal—than it does about the oil industry. And yet everyone depends to some extent on oil.

Even though there are more than 1000 oil companies, Opinion Research Corporation's survey revealed that one of every three people in this country thinks the oil industry is a monopoly.

The importance to an industry of a program of education and the benefits which can accrue is shown in the case of the nation's railroads. A few years back they shook themselves from their state of complacency, authorized a public opinion survey and decided to do something about it. From a "fair" job which a bulk of the people thought the railroads were doing in 1941, this opinion had risen to "excellent" in 1944. And this was in spite of the terrible service which most people experienced when they tried to ride wartime trains. This rise in appraisal was credited to the advertising and public relations program conducted by the American Association of Railroads.

Of encouragement to the oil industry is Opinion Research Corporation's conclusion that "Those who know you well—think well of you." The industry's own workers have a better opinion of it than does the general population. This clearly indicates that there is work to be done outside of the industry in order to correct this adverse opinion.

Field men, by the API plan, would get out and do the spade work. They will contact the public generally with frequent calls upon those who, as the expression goes, "mould public opinion." Doubtless oil industry officials and other workers will be given roles to perform.

The API is to be commended on its program to convince the people that "Petroleum Is Progressive." A public impressed with the progressive character of the industry will have a favorable opinion of that industry.

Oil and the Pyramids

WRITING in a letter to the editor of the *Saturday Review of Literature*, a man who gives his address as Hollywood, Calif., advises the editor that he is going to start a "Save the Pyramids from Standard Oil Society" movement because he is peeved by seeing a picture of an oil drilling derrick near the Pyramids.

It appears that, in this gentleman's mind, this is, indeed, a most revoltin' development. One could judge by his letter that he belongs to that class of Americans who find time heavy on their hands and consequently must needs start a movement.

When we read his letter we found ourselves in a quandary, though, as to whether the gentleman's economic sense was outraged by an American derrick in the shadow of the world's greatest monument to slavery, or whether it was just that Hollywood aesthetic sense giving vent.

But anyway he thinks that Gromyko will agree with him. Probably!

Another Problem for Scientists of USSR

THOSE among us who have been Doubting Thomases regarding actual technical progress being made in Russia, had their minds disabused by an item which appeared in "Around the World," a department in the November 7 issue of Winnipeg *Free Press* as follows:

"A hole 20 miles into the earth has been drilled with an electric drill by Russian geophysicists. The experiment, conducted near Leningrad, was achieved in two days. Said the Moscow radio: 'Until now, if it were at all possible, this would have taken several years'."

We are indebted to J. Leonard Mander, vice president and general manager of Waywasecapow Oil Company, Ltd., of Winnipeg for the clipping and this comment:

"It would appear to me that someone has made an error, but according to the *Free Press*, it is exactly as reported by the Associated Press.

"The item reminds me of Mark Twain's 'grossly exaggerated' retort on reports of his death.

"It would be nice to know just what has been accomplished by the electric method of drilling, which I understand the Russians have been experimenting with for years. They may have something that will revolutionize our present methods, resulting in much lower costs. If they have, we should all know about it."

With the solution of this one problem already in hand, maybe Russian technologists will rip into another, i.e., mechanism which will effectively lift the well-publicized iron curtain so that the world will know just what and what not to believe concerning doings in the USSR.

* * *

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—Brig. Gen. DONALD ARMSTRONG

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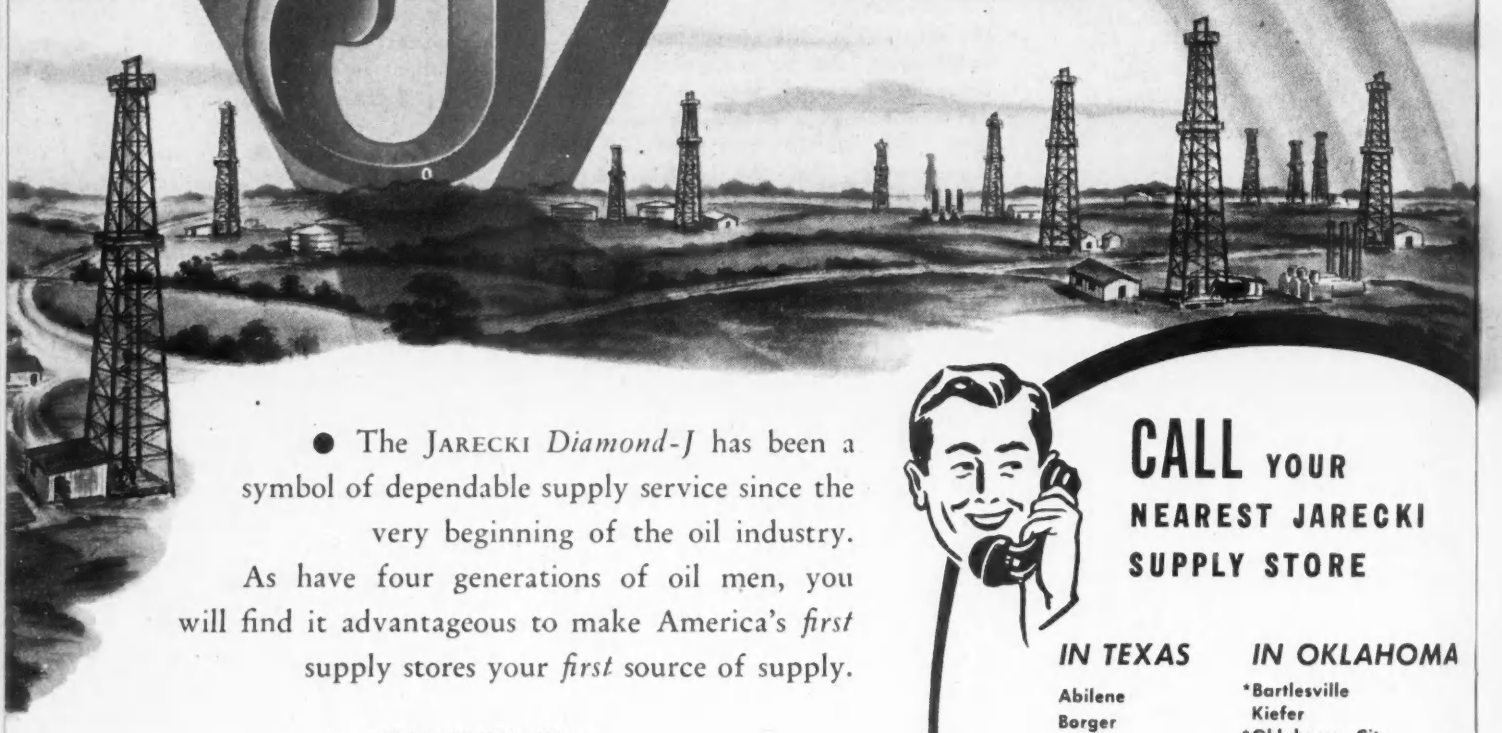

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The Week's News

DISPOSITION of the Big Inch pipe lines has been thrown in the lap of Congress by WAA Administrator Littlejohn's rejection of all bids after informal recommendation was made that the Big Inch Oil proposal be accepted. Hearings before a House investigating committee bring warning from Representative Walter that Pennsylvania will not permit lines to be used for natural gas. See below.

Army-Navy Oil Procurement—The War Department is about to consolidate its petroleum purchasing offices in anticipation of merger of Army and Navy procurement. Below.

State Department Outlook—The State Department's foreign service, including activities in the field of oil, may be subject to investigation as well as economy demands in the coming session of Congress. Page 26.

Study Stripper Subsidies—In view of crude price increases, OWMR officials at the weekend were studying reduction of stripper subsidy rates. Page 26.

GOP to Oppose Pact?—Senator Tom Connally thinks Republicans in Congress will oppose the pending Anglo-American Oil Agreement. Page 26.

Leasing Regulation Revisions—The Rocky Mountain Oil and Gas Association in annual convention heard discussion of the need for revisions in regulations governing leasing of public lands. Page 25.

J. Edgar Pew Dead—Friday marked the passing of J. Edgar Pew, vice president of Sun Oil Company, one of the outstanding leaders of the oil industry. Page 24.

INGAA Annual Meeting—Relief through Congress whereby authority of the FPC would be restricted was urged before the INGAA in annual session and the gas and oil industry was urged to present a solid front in the fight. Page 27.

Elk Hills Contract—The Navy Department has made a counter-proposal for revision of the Elk Hills contract with Standard Oil Company (California), offering to bear 32 percent of the cost of the readiness program instead of the 60 percent suggested by the company. Page 25.

ICC Authority Extended—The Supreme Court has held that privately-owned pipe lines are subject to the jurisdiction of the Interstate Commerce Commission in a decision ruling that the Champlin Refining Company's pipe line makes it a common carrier. Page 28.

Japan's Oil Industry—Japan's indigenous natural petroleum industry would be left in that country, but she would lose all synthetic-rubber plants under recommendations submitted to President Truman by Reparations Commissioner Edwin W. Pauley. Japanese crude production currently is running around 30,000 barrels weekly.

Coal Competition Called the Payoff

"Background" back of WAA's decision to throw out all bids for the Big Inch pipe lines was the persuasive voice of Attorney General Tom Clark.

Just prior to the opening of hearings, Clark called Littlejohn into conference and reportedly told him the administration was determined to curb John L. Lewis' power, and that one way of so doing might be through conversion of the lines to natural gas.

Littlejohn, who was prepared to tell the committee he had no yet reached any decision, was urged to toss out all the bids to pave the way for a new deal in which the emphasis would be taken off the oil phase.

It couldn't be done overnight, of course, but if the lines were converted to gas they might replace as much as 14 million tons of bituminous and over 5 million tons of anthracite a year, about 2 percent of annual output for the former and 10 percent for the latter.

Consolidation Planned for Army Oil Purchasing Units

The Army's system for purchasing petroleum products will be reorganized December 1 in anticipation of unification of Army and Navy petroleum procurement by the Army-Navy Munitions Board.

Three offices which now split oil procurement will be consolidated in a petroleum purchasing section to be set up in the Washington Quartermaster Depot at Alexandria, Va., under the Joint Army-Navy Petroleum Purchasing Agency, under the direction of Captain Robert M. Jefferson, formerly terminal and operations manager for Standard Oil Company (New Jersey) in Washington.

Coal States' Opposition to Big Inch Conversion Is Brought Into the Open

An opportunity for Congress to express itself on the disposition of the Big Inch pipe lines, if it so desires, was assured last week when War Assets Administrator Robert M. Littlejohn announced rejection of all of the 16 bids.

Littlejohn told the House Surplus Property Committee at the opening of an investigation into the handling of the war-built oil carriers, that he would invite bidders to submit new "informal" proposals within two weeks.

The administrator, who said he had not reached any decision on whether the lines should be retained for oil service or converted to natural gas, thought that none of the bids gave the government the financial return it should have. An appraisal of the lines set their current worth at $113.7 million, he declared.

He also testified that none of the bids met conditions recently laid down by the joint Army-Navy Petroleum Board. (It had previously been disclosed that Army and Navy officials, originally supporting retention of the lines for oil service, now saw no objection to their conversion to natural gas.) Littlejohn said, however, that a spokesman for the joint board recently specified that if the lines were converted they must be kept in such condition that they could be returned to the government for transportation of oil within 30 or 40 days in the event of an emergency.

Accordingly, he said, no purchaser of the lines will be permitted to sell or operate them in such a way as to vitiate their military value, and it also will be necessary that the oil handling equipment be retained and kept in workable condition.

The gas men asserted there had been no change in the position of the Army-Navy Petroleum Board and later L. Gray Marshall, chief of the WAA utilities branch, agreed that, in his opinion, the board merely had clarified its original position.

Representative Francis E. Walter of Pennsylvania declared that Littlejohn had thrown away his opportunity to dispose of the lines, asserting that the Defense Plant Corporation's agreement with his state precluded use of the lines for any commodities except petroleum and by-products, adding that natural gas did not come within that category.

While the gas bidders were aware of Pennsylvania's opposition and most of their proposals were contingent upon WAA being able to deliver the necessary rights-of-way for gas, Walter brought the issue out into the open, telling the committee that "no gas company will ever get a permit from the state of Pennsylvania."

Revealing that an "informal" recommendation that the Big Inch systems be sold to Big Inch Oil, Inc., had been submitted some three weeks earlier to the WAA real property board by his utilities branch, Marshall also disclosed that Littlejohn's decision to jettison all bids was not made known as far down the line as his office.

The company's proposal, he said, was to be accepted with some modifications "to protect the government's interests" in the provisions for the income debentures which were to form part of the payment and necessary provisions on common carrier operations.

Marshall expressed total ignorance of how Littlejohn would go about getting

informal bids, or whether additional bidders would be permitted to offer proposals. It will take at least three months to dispose of the lines after receipt of new proposals, he explained.

Support also was given the Big Inch Oil proposal by J. S. Jenner, negotiator on pipe lines, who outlined the various recommendations that had been made by the oil industry and others before the O'Mahoney committee and elsewhere and reviewed the considerations that moved the Surplus Property Administration to recommend last January that the lines be retained in oil service.

Jenner thought the best possible use of the lines would be for oil, and said there would be sufficient oil available to make their operation economic. Questioned about the tanker situation, he said surplus tanker disposal had been turned over to the Maritime Commission and so did not enter the picture, so far as WAA was concerned.

DeGolyer Testifies

The impracticability of using the lines for oil in peacetime was brought out emphatically by two well-known figures in the industry, E. DeGolyer, Dallas geologist and engineer, and Sidney A. Swensrud, vice president of Standard Oil Company (Ohio).

Both men assailed WAA policy, DeGolyer pointing out that economic use of the lines would depend upon a number of factors, not the least of which is the relative level of pipe line and tanker transportation costs, and explaining where the difference is so small tankers always have the edge because of their greater flexibility.

The point, however, could be settled easily, he said, "by calling for bids for straight oil use with no option for gas after some token attempt to put oil through is not successful."

DeGolyer pointed out that the industry is producing and marketing more oil now than ever before, showing that its transportation facilities are adequate. "If these lines were placed into oil transportation, you would only displace that much capacity already existing," he said. "The only way they can be preserved and have emergency value is to keep them in standby or use them for gas."

Disposal of the facilities has been made "needlessly complex," he charged, adding that someone in Congress or the government should determine whether they are to be used for oil or gas and then ask for bids after setting forth definitely the conditions. There should be no "variables," such as the present uncertainty over issuance of the necessary FPC certificate or rights-of-way.

DeGolyer told the committee he didn't "want any part" in informal bidding as outlined by Littlejohn, but did not say that the group with which he is associated, E. Holley Poe and associates, would not submit a new tender.

Swensrud emphasized that use of the lines for oil would merely displace existing industry-owned facilities and, if the Little Big Inch was used to move products into the Mid-West would leave that area short of heavy residual, which cannot be pipe lined. The disruption of the industry, he contended, would be so great as to offset any benefits derived from use of the lines.

He also attacked the Surplus Property Administration's policy report as failing to consider the views of the industry, or the effect of use of the lines on production, refining and transportation. He added that the recommendation that if the lines could not be sold for oil they be operated by the government came as a "shock" to the industry.

The WAA disposal policy is all wrong and should be reversed to give preference to gas, he said. In the event of an emergency, one line could be used for gas and the other converted back to oil and, by the installation of additional compressors and pumps, their capacity could be greatly increased.

Louisiana's View

Opposing conversion of the lines to gas, Pierce A. Frye, executive director of Natural Gas Conservation for Louisiana, expressed the fear that such an action would deplete the state's gas reserves.

The right-of-way agreement for the Little Big Inch stipulates that it shall not be used without permission of state authorities to export gas produced within Louisiana, but Frye explained that if the FPC granted a certificate for gas transportation he did not see how the movement of Louisiana gas could be prevented. The Big Inch does not cross the state, but is close enough to permit feeders.

Previous Project Recalled

Frye said that in 1940, before the Big Inch was even thought of, Reserve Natural Gas Company asked the FPC for a certificate for a gas line over approximately the same route. The commission expressed concern over the serious problem of conservation, he said, and it was later withdrawn.

If there is any doubt about the advisability of using the lines for gas, he told the committee, the whole matter should be referred to FPC for investigation and report before action is taken.

Former Secretary of the Interior Harold Ickes has been listed as a December 2 witness at the hearing.

Pioneer Dies

J. EDGAR PEW, 76, vice president of Sun Oil Company and one of the best known pioneers in the petroleum industry, died November 22 at Philadelphia.

Born on September 27, 1870, at Mercer, Penn., Pew's first job was at the age of 16 with People's Natural Gas Company. After 10 years at Pittsburgh, he joined Sun at Toledo in 1896. Founded by Pew's uncle, Joseph Newton Pew, in partnership with E. O. Emerson, who later retired. Sun Oil Company was then only 10 years old.

From 1901 to 1912, Pew worked in the Texas oil fields, laying pipe lines, obtaining leases and drilling wells to meet the mounting crude oil requirements of the new refinery Sun had built at Marcus Hook, Penn., in 1901. Early in 1913 he resigned to become an independent producer in Tulsa, but in December of that year he joined The Carter Oil Company as vice president and western manager. In 1919 Pew resigned from Carter and returned to Sun as vice president, and as president of the Sun Pipe Line Company of Texas, a subsidiary.

Noted for his leadership in the movement of standardization of oil field machinery and equipment, and in the advancement of scientific methods of oil discovery and development, Pew was the first recipient of the gold medal for distinguished service to the petroleum industry awarded each year since 1936 by the American Institute of Mining and Metallurgical Engineers. He was president of the Mid-Continent Oil & Gas Association for three years, beginning in 1916, and was the second president of the American Petroleum Institute, serving in 1924 and 1925.

It was under Pew's presidency that the API created the Committee of Eleven, of which he was chairman and which made the most detailed and exhaustive survey of the nation's oil resources ever undertaken. Since its formation in 1936, he was chairman until succeeded recently by F. H. Lahee of the important API Committee of Petroleum Reserves, the recognized authoritative source for yearly estimates of proved oil reserves.

Pew married Miss Martha Layng in 1899 and they have three children, John G. (Jack) of Dallas, Texas; George L. Pew, and Mrs. Martha Elizabeth White.

Pew and his twin brother, John G., president of the Sun Shipbuilding & Dry Dock Company, wholly-owned Sun subsidiary, celebrated their diamond birthday last year.

Navy and Standard Urged by House Group to Reach Elk Hills Agreement

The Navy Department has rejected proposals of Standard Oil Company of California for amendment of its Elk Hills contract and has made a counter-proposal to split the "readiness-program" cost so that the Navy bears 32 percent of it and Standard 68 percent until the end of the primary period, approximately three years hence.

The counter-proposal was developed shortly before the House Naval Affairs Committee re-opened the hearing and F. S. Bryant, company vice president, was unable to say whether it would be acceptable.

Secretary James Forrestal testified that adoption of the proposal that the Navy assume two-thirds of the cost of preparing the field for stand-by in a condition of readiness was approved by two independent experts, E. DeGolyer of DeGolyer & MacNaughton, and A. I. Jacobsen, president of Amerada Petroleum Corporation, as well as by the Army-Navy Petroleum Board, but that he personally was not convinced.

Right Questioned

The basic question involved, Forrestal explained, is the loss the company will incur by having about $1.2 million—representing the cost of the readiness program—tied up in the field for up to 60 years, until final settlement is made, without interest.

In return for an adjustment whereby the Navy would pay 60 percent of the readiness cost, the company offered to forego its asserted right to terminate the primary period and, by refusing to accept the oil produced, force the adoption of the permanent split of costs and output on the basis of eight-ninths for the Navy and one-ninth for itself. However, Forrestal said, there was some question whether the company actually had the right to take such a step. There are equities which Forrestal said should be taken into consideration and on that basis a compromise proposal would be in order, which would split the loss equally between the government and the company. The government's capital investment already amounts to $13 million, or $4.5 million more than its current share.

Amendment of the contract was opposed by Representative Lyndon B. Johnson of Texas, who claimed that the most advantageous move for the government would be to permit the company to terminate the primary period, and then pay eight-ninths of the cost and take eight-ninths of the oil, which would result in a revenue to the Treasury of something like $2 million a year.

Navy Prefers Oil in Ground

Johnson declared that under present conditions, the company is producing 8450 barrels of oil from the naval reserve daily, two-thirds of which is Navy oil, and is permitted to sell and return the proceeds from the latter, although Forrestal explained that the oil withdrawn is not charged against the Navy's interest but against Standard and the Navy is anxious to retain all of its oil in the ground.

Chairman Carl Vinson urged that Forrestal and Bryant get together as quickly as possible and submit a firm agreed-to proposal by December 1 so that the committee could, by proxy vote of its members, decide before the end of the year whether it was acceptable. Under the law, the Navy Department must have approval of the naval affairs committees of House and Senate before making changes in the contract.

Foster to Speak

T. R. Foster, manager of centrifugal compressor sales for Clark Bros. Company, will discuss "Centrifugal Compressors" at a meeting of the California Natural Gasoline Association at the Rio Hondo Golf Club, Los Angeles, on December 5.

Crude Oil Production in the United States

(Estimates compiled by THE OIL WEEKLY. All figures indicate daily averages in barrels.)

STATE OR DISTRICT	PRODUCTION IN WEEK ENDED Nov. 23	Nov. 16
Alabama	1,100	1,000
Arkansas	73,400	73,850
California	876,700	875,000
Colorado	35,750	36,250
Florida	*	*
Illinois	202,200	192,650
Indiana	19,250	19,300
Kansas	280,700	269,900
Kentucky	30,050	30,150
Louisiana	400,850	400,350
North Louisiana	91,500	91,000
South Louisiana	309,350	309,350
Michigan	45,000	46,300
Mississippi	79,550	78,900
Missouri	100	100
Montana	23,600	23,750
Nebraska	750	750
New Mexico	101,000	101,000
New York	13,900	13,500
Ohio	8,500	8,200
Oklahoma	366,900	365,200
Pennsylvania	36,600	35,500
Tennessee	35	35
Texas	2,096,755	2,096,755
Tex. R. R. Comm. Districts:		
Dist. 1—S. Central	18,985	18,985
Dist. 2—Lower Gulf Coast	147,200	147,200
Dist. 3—Upper Gulf Coast	464,325	464,325
Dist. 4—S. West	226,325	226,325
Dist. 5—E. Central	36,835	36,835
Dist. 6—E. Texas Field	324,000	324,000
Dist. 6—Rest of N. East	105,075	105,075
Dist. 7-B—W. Central	35,300	35,300
Dist. 7-C—West	29,510	29,510
Dist. 8—West	507,250	507,250
Dist. 9—N. Central	121,400	121,400
Dist. 10—Panhandle	80,550	80,550
West Virginia	8,900	7,900
Wyoming	106,000	108,500
Total United States	4,807,590	4,784,840

* Well shut-in.

Total stocks, foreign and domestic November 16, as reported by the Bureau of Mines were 221,670,000.

Need for Leasing Law Changes Told to RMOGA

Discussions of new leasing regulations highlighted the convention of the Rocky Mountain Oil and Gas Association in Denver last week. More than 700 industry representatives were registered.

Joel D. Wolfsohn, acting associate director, Bureau of Land Management, gave the historical background to regulations recently issued by the Interior Department as a result of amendments to the Federal Leasing Act.

The regulations contained only two of the many recommendations made by the industry, and it is expected that the Rocky Mountain Association will go on record advocating revisions.

Particular disapproval was voiced in regard to Section 192.4 concerning options. Under the present interpretation no geophysical options may be taken in excess of 100,000 acres in each state by an individual or company and options held prior to June 1, 1946, while not held to be chargeable under this section, still limit new options on acreage.

Wolfsohn made reference to changes to come under the President's reorganization plan No. 3 and said the "organizational structure of the new bureau (land management) is still in the making." He said the department is contemplating plans for broadening authority of field units but revealed no details.

Regional Land Management Offices Announced by Krug

Decentralization of the Bureau of Land Management to provide better and quicker service in the public land states was announced last week by Secretary of the Interior J. A. Krug.

Seven regional offices have been established, each with an organization paralelling that in Washington. The office at Albuquerque, N. Mex., will handle all public land matters in Arizona, New Mexico, Texas, Oklahoma, Arkansas and Louisiana, and an office in Billings, Mont., will cover that state and Wyoming, North and South Dakota, Nebraska, Kansas, Iowa and Missouri. Another office will handle Utah and Colorado, with headquarters in Salt Lake City, and will be the first to be placed on an operating basis.

Krug said that the new plan calls for the exercise of broad authority and responsibility by the regional offices.

Wilcox Sand Discovery in Adams County, Mississippi

A new Wilcox sand oil discovery for Mississippi apparently is assured at Phillips Petroleum Company's Mrs. Vic Artman 1, located in 36-8n-2w, six miles northeast of Natchez in Adams County.

On an 18-minute drill-stem test, using ¼-inch top and bottom chokes, the recovery was 3885 feet of 37.7-gravity crude oil and 15 feet of mud with no water. Bottom-hole flowing pressure was 1810 pounds. The test was made at 5588-5625 feet.

Phillips cored the test deeper and is credited with logging approximately 50 feet of Wilcox sand.

Gibbons' Mid-Continent Job Goes to Charles E. Simons

Charles E. Simons of Austin has been elected vice president and general manager of the Texas Mid-Continent Oil and Gas Association and will assume his duties January 1. He succeeds the late George C. Gibbons.

Charles E. Simons

For the past three and one-half years, Simons has been executive vice president of the Texas Good Roads Association. Previously he was editor of *Texas Parade*, a magzine published by the Good Roads Association, and was the association's director of public relations.

Simons formerly was a member of the Capitol staff of the Associated Press, and also worked for other news bureaus in Austin. He was secretary of the State Democratic Executive Committee of Texas 1942-44, and was temporary and permanent secretary of the 1944 Democratic conventions in Austin and Dallas.

Perlitz Named Executive Vice President of Conoco

Charles A. Perlitz, Jr., of Houston, last week was elected executive vice president of Continental Oil Company by the board of directors, Dan Moran, president, announced.

Perlitz, 43-year-old native Texan, succeeds W. W. Bruce who retired November 1, and becomes one of the country's youngest senior executives of a major oil company.

The new executive finished Georgetown University, Washington, D. C., in 1925 and got his law degree from Harvard in 1929. After practicing law for nine years, Perlitz was associated with Strake Petroleum, Inc., for seven years. He joined Continental on January 1, 1946, as general attorney at Houston.

Hardey Warns Against Oil Imports, Excessive Stocks

An artificial demand for crude oil exists today because of the intensive desire of some to build up excessive stocks, B. A. Hardey of Shreveport, president of the Independent Petroleum Association of America, told the Texas Independent Producers and Royalty Owners Association in Houston last week. Such a situation is a serious threat to the recent increase in the price of crude oil, he believed.

"If the gasoline inventories continue their present rate of increase these stocks will reach a total of between 115 million to 120 million barrels by March 1, an all-time peak, and experience has shown that excessive stocks tend to soften the price structure of motor fuel as well as crude oil," he declared.

To relieve this situation, Hardey advocated cutting production another 100,000 barrels daily and called on the refiners to reduce their yield of gasoline and increase the output of heavy fuel oil.

Hardey said he did not believe product prices should be hiked because of the recent crude oil price boost.

He warned the independent oil men to prevent waste by keeping inventories in line with demand and also warned against an increase of imports of cheap oil from Saudi Arabia and Venezuela.

Judge Joseph Montague of Fort Worth, chief counsel of the Texas Cattle Raisers' Association, said the independent producer must organize in self defense to protect himself.

H. J. (Jack) Porter of Houston, association president, presided.

Plan to Continue Stripper Subsidies, but Study Made

Only a few of the wartime financial aids will continue through the remainder of the fiscal year, Reconversion Director John R. Steeling said last week. These will include the stripper well subsidy, the cost of which for the next seven months is placed at $11.7 million, and premium payments on certain metals.

There were indications, however, the stripper-well payments might be even less than estimated. New increases in prices posted in several producing areas have centered attention again on subsidy rates, with the probability that they will be further reduced in line with the policy adopted last summer of reducing payments by the amounts of price increases. OWMR officials are studying the situation.

Unaffected likely will be Pennsylvania grade crudes for which a subsidy of 50 cents a barrel is being paid. Recent price increases were not posted in this area.

Sees GOP Opposed To Oil Agreement

Probable opposition to the Anglo-American Petroleum Agreement from the Republican majority in the new Congress was foreseen last week by Senator Tom Connally of Texas, who in January will step down as chairman of the Senate Foreign Relations Committee.

Connally said he anticipated that the agreement would be set for hearing next year and full opportunity given for its discussion by all interests, but did not indicate whether any effort would be made to press for hearings early in the session.

His own position on the agreement, he said, will be determined by the facts developed during the testimony.

In answer to a question whether he had discussed the agreement with the Republican majority, Connally said he did not know how they would view it but expressed the personal opinion that their position would be one of opposition. He did not indicate whether Senator Arthur Vandenberg of Michigan, slated to succeed as chairman of the committee, had expressed any opinion on its desirability.

Republicans Will Make State Department Check

Activities of the State Department, including presumably its efforts to regulate the international petroleum industry through a world-wide agreement, will get a thorough working over by the Republican Congress next year.

If no special investigation is ordered, the department's operations will be probed by the House Appropriations Committee when officials appear before it next winter to support their requests for funds, but it is quite in the cards for one or another of several investigatory resolutions unsuccessfully pressed by Republicans last session to be adopted.

Department policies on oil may be subject to some alteration, also, to conform to legislation on national oil policy which Congress is expected to enact on the basis of the report now being prepared by Chairman Joseph C. O'Mahoney of the Special Petroleum Committee.

Biggest handicap to department plans may be the Republican economy drive. With the war over, officials will be hard pressed to show that even with their ambitious plans for expansion and improvement of the foreign service, in which they have Republican support, it will be necessary to spend as much as the $120 million they receive for this year. (The department was given $23 million for 1941.) Republican leaders feel that the efficiency of our diplomatic service would not suffer if funds were cut.

Committee to Nominate Council Officers Named

The next meeting of the National Petroleum Council will be held January 21 and thereafter quarterly in April, July and October.

A five-man committee was set up last week by temporary Chairman Walter S. Hallanan to receive nominations from the council for permanent chairman and vice-chairman. The committee, which may report in January, comprises R. G. Van Der Woude, president of Shell Union Oil Corporation, chairman; W. H. Ferguson, executive vice president of Continental Oil Company; B. L. Majewski, vice president, Deep Rock Oil Company; Charles F. Roeser, president of Roeser and Pendleton, Inc., and Reese H. Taylor, president of Union Oil Company of California.

Halliburton Wins Court Infringement Suit Verdict

By a decision last week the Supreme Court in an 8-to-1 opinion overruled the Ninth Circuit Court of Appeals and held Halliburton Oil Well Cementing Company had not infringed a patent issued to Cranford P. Walker of Los Angeles covering certain apparatus designed to determine how far up in an oil well bore the oil extends from surrounding strata. Dissent was filed by Justice Burton.

Bowes Named INGAA President

Industry urged to present a solid front in its efforts to curb the authority of FPC

By C. C. PRYOR, Staff Writer

All natural gas men, and oil men, must give careful attention to any amendatory legislation proposed by the Federal Power Commission, the coal and railroad people, or the natural gas industry itself, and to the report, soon to be issued, by the FPC on its investigation of the natural gas industry, E. Buddrus, retiring president of the Independent Natural Gas Association of America, told the organization's second annual meeting in Fort Worth, November 22.

Buddrus, president of Panhandle Eastern Pipe Line Company, urged individual members of the association to discuss the industry's problems with their representatives in Congress, so that when legislation is being considered, there will be full information.

In his annual report, Buddrus stated that the philosophy adopted by the FPC in the Interstate Natural Gas Company case must be corrected, or the entire petroleum industry, including those primarily concerned with oil, will be adversely seriously affected.

"In that rate case," he said, "the FPC again applied its rate-making policies to the well-head price of company-owned production. The philosophy adopted by the commission to justify its action is such that if extended to its ultimate conclusion will place under the jurisdiction of the commission any producer of natural gas which might be determined by the commission to eventually enter interstate commerce. This is not an idle thought. The American Petroleum Institute recognized this situation in a resolution passed at its recent convention."

Notable Accomplishments

In tracing the three-year history of INGAA, Buddrus pointed out that the association has participated in a number of important matters before the FPC and the courts, as intervenor, and the record of accomplishments is excellent; also the association participated in the hearings of the Senate Special Committee Investigating Petroleum Resources, and in the work of several of the industry committees active during the war period. The association now has a membership of 1600, representing royalty owners, producers, pipe lines, and others interested in natural gas.

"I am satisfied," he said, "that we have been tested and are recognized as a stable, permanent organization which much be reckoned with whenever the industry's interests are concerned."

"The Transportation of Natural Gas," free exercise of managerial discretion in conducting the business of a natural gas pipe line company, was emphasized by D. A. Hulcy, president of Lone Star Gas Company. Hulcy outlined aspects of the natural gas industry which he said necessarily must be subjected to governmental regulations because of its effect on the general public, but pointed out that in the natural gas business, the quickening spirit of the enterprise is found in the free exercise of managerial discretion in originating and in passing final judgment on those vital matters on which success or failure so frequently depend and which so effectively differentiate the natural gas business from all other utilities subject to public regulation.

Discussing the transporters' interest in adequate gas supplies, Hulcy said they are anxious to see that fields supplying them with gas are operated and maintained to recover the greatest amount of gas.

"This desire and self interest, if you please, should, and in most instances does, cause the transporting company to forego special temporary advantages in producing its wells when the overall and long range welfare of the field requires such action," he said.

Prorated Withdrawals Seen

The proration of gas withdrawals among wells and leases within an individual field will become more and more the general practice until it is universal, Hulcy asserted. "A proration formula should be devised and applied in such a way as to reasonably assure the complete development of the field within a reasonable length of time on a well-spacing basis which is as uniform as possible. If this is done with due consideration to the economic factors which control, we will see in the future fewer and fewer fields with areas which remain undeveloped throughout the life of the field causing underground waste of gas. Also we will see fewer owners who fail to realize income from properties which should be productive if they could be drilled.

"It would be far better for wells to be spaced too widely in the early life of a field in order to insure complete development on a uniform basis than to space the early wells too closely at the cost of having portions of the field undeveloped forever," he said.

Hulcy urged producers and transporters to make every effort to jointly solve the problem of casinghead gas waste, suggesting that there should be some adjustments on each side and these should be undertaken in good faith with a full realization of the mutuality of the deal and of the benefits which will accrue to both of the parties."

"The essence of what I have said about the casinghead gas problem," he added, "is that it is not a question of the oil industry versus the gas industry, but that it is in fact a problem for both. It is a problem which should be solved by the petroleum industry without the imposition of rigid regulatory formula."

"The natural gas industry has had to swallow some bitter pills in the form of court decisions which many feel have, by judicial incubation, enlarged the scope and jurisdiction vested in the FPC by the Natural Gas Act," Mark Adams, chairman of the legal committee of INGAA told the association.

"As far as the natural gas industry is concerned, the FPC in effect says the American institution of free enterprise does not exist.

"No matter how much the industry disagrees with the courts, the only adequate remedy is by legislation."

Principles and implications embodied in the Interstate Natural Gas Company decision "appear to be a culmination of the succession of steps, whereby the tentacles of federal control have apparently drawn within their grasp certain phases of the gas industry thought by producers and others to be completely excluded by the Natural Gas Act," Adams stated.

He urged that all force possible be put behind a move to cause Congress to amend and clarify the act. Recommendations of the Natural Gas Industry and purpose of the proposed amendments to the act were summarized by Adams as follows:

(A) To limit FPC jurisdiction to the activities described by Congress as affected with a public interest, namely, the transportation in interstate commerce and sale after such transportation to local distributors for resale to ultimate consumers; (B) to insure that a producer of gas who also is an interstate transporter will have an opportunity to obtain a fair return on his producing properties which will encourage better field prices to the independent producer, and (C) to eliminate some of the mechanics required in certificate cases and allow reasonable improvements and extensions without hearing.

A firm stand on the proposals made by the industry committee was urged by Adams.

Gulf Source Seen

The eastern area of the United States will be in a desperate position in obtaining sufficient quantities of natural gas this winter, Captain E. S. Pettyjohn, director of the Gas Institute of Technology, Chicago, said. The Appalachian fields are in depletion stage, and although there is ample supplies of gas in the Southwest, the facilities for getting the gas to the east are insufficient, he declared.

Dr. E. DeGolyer said that proved recoverable natural gas reserves for the U. S. ranging from 130 to 150 trillion cubic feet was, in his opinion, a most conservative estimate. He said that additional petroleum reserves will be found in the subsurface rocks underlying the Gulf of Mexico.

Judge P. A. Lasley of Little Rock, Arkansas, told the delegates that the only escape for the industry is strong and active state regulation.

Officers elected at the Fort Worth meeting of INGAA are as follows:

President, Joseph W. Bowes, Tulsa, president Oklahoma Natural Gas Company; first vice president, Paul Kayser, Houston, president, El Paso Natural Gas Company, (re-elected); second vice president, J. H. Dunn, Amarillo, president Shamrock Oil & Gas Company (re-elected); treasurer, F. W. Peters, Tulsa, treasurer Oklahoma Natural Gas Company (re-elected); executive director, John A. Ferguson, and general counsel, Wesley E. Disney, both of Washington, D. C. and both re-elected.

New directors named were H. W. Long, E. Buddrus, D. D. Harrington, Bowes, Kayser, Gardiner Symonds and W. H. Wildes.

New Increases for Crude Petroleum Make Weighted Average Price $1.66

Crude oil prices have been advanced throughout the Southwest, Mid-Continent, Middle West, and Rocky Mountains, as virtually all other purchasers during the past week followed the lead of Sun Oil Company, which had raised postings in Texas and Louisiana. Most grades have been increased 10 cents a barrel except Gulf Coast Grade A and Mirando lube-quality crudes, which are up 20 cents basically on the gravities posted. Practically all purchasers made the new schedules effective November 15, as Sun had done.

Sun Prices Followed

Except in a few instances, the new crude prices are the same as the new postings adopted by Sun Oil Company, which thus found that other purchasers generally agreed with its analysis of the proper levels for prices under existing market conditions. This general acquiescence with Sun was assured when Humble Oil & Refining Company, largest Texas purchaser and important price leader, came out with new schedules November 19, posting increases retroactive to November 15.

Within a short time, general 10-cent increases then spread to Oklahoma, Kansas, Arkansas, Mississippi, Illinois, Indiana, Kentucky, Michigan, Colorado, Wyoming, Montana. Companies posting increases included such substantial purchasers as Magnolia Petroleum Company, Continental Oil Company, Phillips Petroleum Company, Gulf Refining Company, The Texas Company, Standard Oil Company (Indiana) purchasing units, The Ohio Oil Company, Standard Oil Company (Ohio) units, Tide Water Associated Oil Company, and others.

Highest Since 1926

Through these increases, the weighted average price of crude oil in the United States probably was increased to approximately $1.66 per barrel, the new posting for Oklahoma - Kansas - North Texas 38 gravity crude, which is a fairly exact index to the U. S. average price. The new 10-cent increase followed advances of 25 cents in July and 10 cents in April, making a total rise of 45 cents since March of this year. This is an advance of approximately 36 percent over the frozen wartime prices.

The present average price of $1.66 is the highest since that of $1.88 per barrel recorded for 1926. It is, however, much less than the prices of approximately $2 per barrel in 1918 and 1919 and the modern era peak of $3.07 reached in 1029.

Representative flat prices now include $1.70 per barrel for East Texas crude, $1.88 for Conro, $1.82 for Illinois Basin. The gravity scale prices now in effect in Oklahoma, Kansas, North Texas, some fields of Eastern Texas and North Louisiana-Arkansas and in light-crude fields of the Rocky Mountains range down from a top posting of $1.70 per barrel for 40 gravity and above, by differential of 2 cents for each degree of gravity, to a generally used minimum posting of $1.28 per barrel for all oils below 20 gravity, with 20-20.9 gravity priced at $1.30.

Nears Depth Record

Pacific Western Oil Corporation's National Royalties 1, in Kern County, California, Friday was drilling at 16,436 feet. This is a little more than 200 feet short of the world record depth of 16,655 feet in the Phillips Petroleum Company's Schoepps 3 in Brazos County, Texas.

The drilling contractors have averaged about 80 feet of hole a day. All equipment is conventional. (Further details on page 65.)

Pipe Line News

ICC Authority Extended To Privately-Owned Lines

Authority of the Interstate Commerce Commission was extended by the Supreme Court last week to include privately-owned lines. The court held that Champlin Refining Company's interstate pipe line makes that company a common carrier subject to ICC jurisdiction.

The company built the 516-mile line between Enid, Okla., and Rock Rapids, Iowa, for its own use. The ICC ordered it to file information for use in making a valuation of the pipe line, which the company refused to do on the ground that it was not engaged in business as a common carrier.

Associate Justices Reed, Frankfurter, Douglas and Burton dissented. The new Chief Justice, Fred M. Vinson, sided with the majority.

The opinion held that while the company challenged the ICC's jurisdiction on the ground that it transported only its own products, the oil actually "is not being moved for Champlin's own use."

"The power of Congress to regulate interstate commerce is not dependent on the technical common carrier status but is quite as extensive over a private carrier," he said.

Six products pipe line systems appear affected by the Champlin decision and as a result will have to file valuation reports with the ICC.

Whiting-Moorhead Pipe Line Due for Early Completion

A 662-mile finished petroleum products pipe line being built by Standard Oil Company (Indiana) from their Whiting, Ind., refinery to Moorhead, Minn., will be completed early in 1947.

Routed via Minneapolis and St. Paul, the combination 10- and 8-inch line will include three pumping stations and five distribution terminals and plants. Transport trucks and railway tank cars will carry products from the terminals to surrounding supply points. Combined tank capacity of the terminals will be 1,238,000 barrels of oil products.

Begun in August, the line will serve northern Illinois and neighboring areas of Iowa, Wisconsin, Minnesota, and North Dakota with gasoline, kerosene, tractor fuel, and heater oil.

Sunray Oil to Construct 83 Miles of 8-Inch Line

Sunray Oil Corporation will construct 83 miles of 8-inch pipeline from its Allen, Oklahoma, refinery to Drumright, as soon as equipment can be obtained.

Costing $1 million, the line will form a connection at Drumright with the Great Lakes Pipe Line Company's system, thus facilitating deliveries of Sunray's products. Sunray will construct a pumping station at Allen, capable of handling a pipeline throughput of about 20,000 barrels of gasoline a day.

Routed through Bristow, the Sunray line also will receive gasolines produced at the Wilcox Oil and Gas Company's Bristow refinery. Wilcox will have half ownership of the 16-mile stretch of the line between Bristow and Drumright.

Mid-West Gas Situation Is Described to FPC

Hearings before the Federal Power Commission on plans of Panhandle Eastern Pipe Line to restrict or interrupt natural gas service to some consumers if necessary during the coming winter were concluded last week. A decision is expected before December 1.

Panhandle engineers testified that increased demand along their system has outstripped their ability to insure full and uninterrupted service under all conditions, and explained that in the event severe weather made it impossible to meet all demand it was proposed to take gas from some classes of consumers in order to insure domestic service.

The plan was opposed by utilities which purchase gas from Panhandle in Texas, Oklahoma, Michigan, Missouri, Ohio, Kansas, Indiana and Illinois.

The critical conditions which the mid-west faces also were stressed in urging the commission to approve an application of the Michigan-Wisconsin Pipeline Company for an $84 million natural gas line to Michigan.

Michigan-Wisconsin was set up by Michigan Consolidated Gas Company to build the line and supply it to the parent company, rather than to buy gas from Panhandle, which is seeking authority for a $23 million expansion of its system.

Japs Seeking Food, Not Petroleum

Completion of five new wells, bringing Japanese crude production up to 28,959 barrels weekly in July, has been reported to the War Department in the military government's monthly review.

Most of the new production on which the military government depends to bring Japanese output above the 30,000 barrels a week mark is expected from the Hachimori field in Akita prefecture, where a well recently drilled by Nitto Oil Company had an initial production of 600 barrels a day but has been cut back to 180 barrels daily.

Imperial Oil Company is studying production costs to eliminate high-cost wells. Only five fields are high-cost areas, and three of these are still being explored. The company's geological surveys are a month behind schedule and the drilling program two to three months behind.

Lack of cash, lack of transportation to remote drilling sites and particularly food and labor shortages are affecting the industry. A special ration of rice above the normal daily allowance has been granted to field workers in the oil industry in Hokkaido, Akita, Yamagata and Niigata prefectures. Oil field laborers spend much time searching for food.

Russians Are Successful in Developing Tuimazy Field

Considerable success in developing an oil field at Tuimazy, between the Volga and the Urals in Bashkiria, Russia, has been announced by the Soviet press, the Department of Commerce reports.

Although previously operated, the Department said, development of the area was delayed by the war until 1944, when a well struck good quantities of oil at a depth of 6560 feet into the Devonian strata.

Of the 1,660,000 tons (about 12 million barrels) of oil produced in Bashkiria as a whole in 1939, 30,000 tons (about 218,000 barrels) came from Tuimazy. Bashkirian output dropped severely between 1940 and 1945 because the shallow wells were good producers only for a limited period.

Tuimazy is scheduled to have 15 wells producing at a rate of 4000 tons (29,000 barrels) a day by the end of 1946, and the five-year plan for the field is the production of 10 percent of the total Soviet output by 1950.

Large Reserves Claimed By Magazine for Russia

A recent article in the USSR Information Bulletin claims Russia's oil reserves as the greatest in the world.

The article, written by P. Ivanov and V. Poznanskaya, said that in 1937 the oil reserves of the Soviet Union were estimated at 6,376,000,000 tons (about 46.3 billion barrels), or 55 percent of the world's "visible" oil reserves.

The output in 1940 was estimated at 31 billion tons (about 225 million barrels) and is slated to reach 35,400,000 tons (about 257 million barrels) annually during the current five-year plan. The objective is 60 million tons (about 435 million barrels) in 1965.

Steady prospecting in the "Second Baku" (between the Volga and the Urals) and discovery in 1944-45 of huge oil deposits in the Tuimazy district of the Bashkirian Autonomous Republic were big factors in the increased production, the article said. The writers declared that the Kuibyshev field was producing four times more oil now than it did before the war.

The USSR Information Bulletin also has reported completion of a 12,808-foot test, deepest oil well drilled in Europe, in the valley between Vinami and Gousanami in the Baku region. A 171-foot derrick was reported used.

Wildcat in North Colombia May Be Shallow Producer

Tropical Oil Company & Socony Vacuum Oil Company's Tubara 1, interesting wildcat in extreme north Colombia, was drilling below 5200 feet last week. Reports from South American sources say the operators will complete the well as a shallow producer before taking it down as a deep test, but this has not been confirmed.

A string of 9⅝-inch casing has been cemented at 3515 feet, to test upper showings. For several hundred feet above the casing seat the section has been largely sand and sandy shale with a few shale breaks separating the sands, all of which are said to carry sufficient showings of oil and gas to almost assure a producer of some kind at the shallow depth. However, it was the intention of the interested companies to make a thorough test of the entire section to 10,000 feet and below, and they probably will do so, inasmuch as the bit has already penetrated the troublesome heaving shale upper formations.

Previously, a number of wells had been started in this area on the strength of earlier geological investigations, but were unable to make progress through the shallower surface formations because of the heaving shale. The success of this well is due to a carefully planned mud program which utilized substances found to be successful in some Texas Gulf Coast areas where conditions were somewhat similar.

Elsewhere in Colombia, Socony-Vacuum interests have established small production in the Las Monas area in the Middle Valley, and The Texas Petroleum Company is hopeful of opening production with Velasquez 1.

Over-Water Location For Test in Nicaragua

Gulf Oil Company and The Atlantic Refining Company are preparing to start their second wildcat in Nicaragua, Central America. Location was made following further geophysical work and interpretation of data from the same operators' Punta Gorda 1, abandoned February, 1945, at 6735 feet. This, a slim-hole stratigraphic test, was the deepest well ever drilled in Central America.

The new location, north of Puerto Cabezas on the eastern seaboard, is overwater and foundations are being constructed. It probably will be several weeks before it is spudded. The diesel-powered rig is being moved in from Punta Gorda 1 which is slightly north. Drilling equipment is capable of drilling to depths around 10,000 feet. The location is near the Caribbean Sea in an eight-foot lagoon.

Further Trouble Likely With Colombian Workers

Although one oil company operating in Colombia has settled its strike with the labor unions by granting a sliding-scale wage increase up to 18 percent, little hope is held for complete tranquillity even should the other companies adjust their differences with labor. Reason for uneasiness is that the basic trouble is political and that the labor syndicates are likely to continue to figure as the most potent weapon of the discontented interests.

Further trouble was presaged last week by defeat in the Colombian Congress, by the Liberal majority, of a proposal for Liberal cooperation with the Conservative administration. It is expected to cause resignation of a number of cabinet ministers, departmental governors, and mayors throughout the country.

Union's 10,000-Foot Project In Paraguay Is Below 6000

Union Oil Company of California's first wildcat on its huge block in Chaco, Paraguay, is drilling below 6000 feet and has encountered the usual stratigraphic column of sands and shales. Projected depth is around 9000 feet, the approximate limit of the rig.

Regardless of the outcome of this test, the company plans to drill other holes. Union has two seismograph parties in the area.

New Zealand Firm Formed

The New Zealand government will own 51 percent of the capital stock of a new company to market gasoline, oil and other petroleum products in the Dominion. An agreement for the formation of the company has been made between the government and the Anglo-Iranian Oil Company and the required legislation has been passed by Parliament. Anglo-Iranian will supply all the petroleum required.

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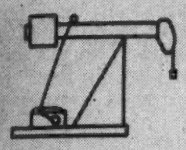
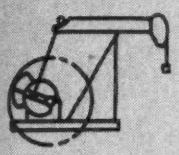
How to Identify the Type 'D' Unit Pumper Line



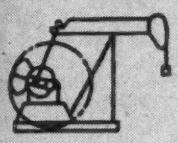
SN-DP

D- 3 SN- 6 DP	
D- 4 SN- 10 DP	
D- 5 SN- 16 DP	
D- 7 SN- 25 DP	



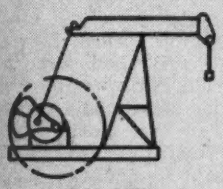
SN-SW
SN-DW

D- 9 SN- 40 DP	
D- 9 SN- 40 DW	
D- 9 SB- 40 DW	
D- 11 SN- 57 DP	
D- 11 SN- 57 DW	
D- 11 SB- 57 DW	



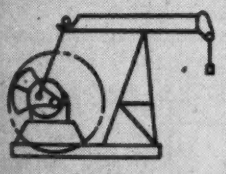
SB-SW
SB-DW

D- 13 SN- 80 DW	
D- 13 SN- 114 SW	
D- 13 SN- 114 DW	
D- 13 SB- 80 DW	
D- 13 SB- 114 SW	
D- 13 SB- 114 DW	
D- 15 SN- 114 SW	
D- 15 SN- 114 DW	
D- 15 SB- 114 SW	
D- 15 SB- 114 DW	



LN-SW
LN-DW

D- 21 LN- 160 SW	
D- 21 LN- 160 DW	
D- 21 LN- 228 SW	
D- 21 LN- 228 DW	
D- 21 LB- 160 SW	
D- 21 LB- 160 DW	
D- 21 LB- 228 SW	
D- 21 LB- 228 DW	



LB-SW
LB-DW

D- 24 LN- 228 SW	
D- 24 LN- 228 DW	
D- 24 LB- 228 SW	
D- 24 LB- 228 DW	
D- 32 SN- 456 DW	

TYPE "D" UNIT PUMPERS NOMENCLATURE

TYPE STRUCTURE GEAR

D - 11 S B - 57 D P - ⋮

- Specials
- P—Plain crank
  W—cWtd crank
- S—Sgl reduction
  D—Dbl reduction
- API size (in-lb/1000)
- N—No Sub base
  B—Sub Base
- S—Short center beam with arc hanger
- L—Long center beam with rein hanger
- C—Combination long center beam with arc hanger (FWO)
- Structure rating in 1000 lb.
- D—"04" series

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Five Years of Operation at the

Langlie Unitized

THE results of five years of operation under a gas-injection program are summarized. The project known as the Langlie Unitized Repressuring Project is located in southeastern New Mexico. The project was started when the average reservoir pressure was 615 pounds per square inch (original pressure was estimated as 1400 psi). After five years of injecting gas into two wells, the average pressure had declined to 467 psi. in the 13 wells. The average gas-oil ratio at start of injection was 2000 cubic feet per barrel, and is now about 11,000 cubic feet per barrel. The greatest operating problem, the channeling of gas, has been solved to a certain extent by controlling injection of gas by packers. It is estimated that recovery by gas injection ultimately will be 43.5 percent greater than primary operation for injection period, or 14.8 percent greater for entire life. (Presented before the Division of Production at the 26th annual meeting of the American Petroleum Institute, Stevens Hotel, Chicago, November 12, 1946.)

THE Langlie unitized repressuring project is in Lea County, New Mexico, in Twp. 25 south, 37 east. It occupies parts of Sects. 5, 8 and 9, and is two miles north of Jal, N. M. The unit was officially started April 1, 1941, for the purpose of instigating a gas-injection program. Figure 1 shows the boundaries of the unit, wells in the general area, and structural conditions under the unit as represented by contour lines on top of the "A" sand. The unit comprises two gas-injection wells and 11 producing oil wells, of which nine are flowing and two are on gas lift. The well density is one to 40 acres. Participants in the unit are Anderson-Prichard Oil Corporation (operator), Rosley Oil Company, First Chicago Corporation, Western Gas Company, and Stanolind Oil & Gas Company. Gas for injection is furnished by the El Paso Natural Gas Company, near Jal, at a low cost. This is essentially a service offered by that company to assist in determining the benefits of injecting gas into this reservoir. Gas is treated to remove hydrogen sulfide, and is compressed to about 1000 pounds per square inch. All produced gas from the unit is then gathered by El Paso Natural Gas Company and processed to remove gasoline, butane, and propane. Oil produced is a mixed-base crude with a gravity of 34, having decreased from an original gravity of 38.

Geology and Reservoir Characteristics

Oil is being produced from lenticular sands of the Lower Seven Rivers or Upper Queen formations (Permian). Sands are intermingled with dolomite and sandy dolomite. These sands range from five to 20 feet in thickness, and are on the southwest side of a folded anticlinal structure trending northwest-southeast. The oil pay is found at depths of 3450 to 3500 feet.

It was necessary to estimate crude characteristics such as bubble point and gas in solution, inasmuch as a bottom-hole sample was never obtained from these wells. Bottom-hole sample data taken from a similar type pool nearby are used to calculate reservoir withdrawals. This assumes a solution ratio of 264 cubic feet per barrel at 550 psi. The reservoir is gas-saturated. The reservoir volume factor is 1.17 at 550 psi. The gas-deviation factor is 0.921 at 550 psi. The original reservoir pressure is estimated as 1400 psi., and repressuring was commenced when the average pressure was about 615 psi. The average pressure on January 1, 1946, was 467 psi. No core data are available but, based on a comparison with similar pools, it is estimated that average porosity is 10 percent and permeability is eight millidarcys, although permeability values have a wide range. The pool does not have an effective water drive. Only a small amount of water is produced. It is estimated that the average net feet of oil-saturated sand is ten to 15 feet.

Figure 2 shows a south-north cross-section through the unit. Electric or radioactive logs and core data were not available on any well. Most of the wells were drilled in with rotary, and drilling time per one-foot or two-foot intervals is available. It seemed that best correlation, therefore, could be made by use of

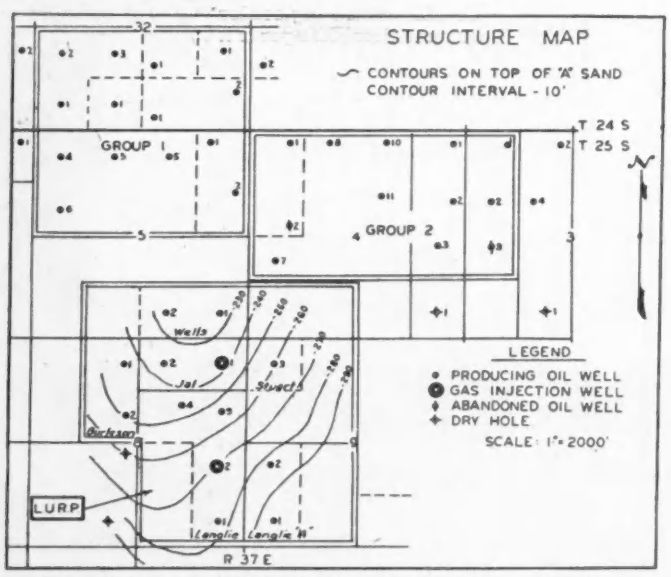

Figure 1. Structure map, Langlie Unit, Lea County, New Mexico.

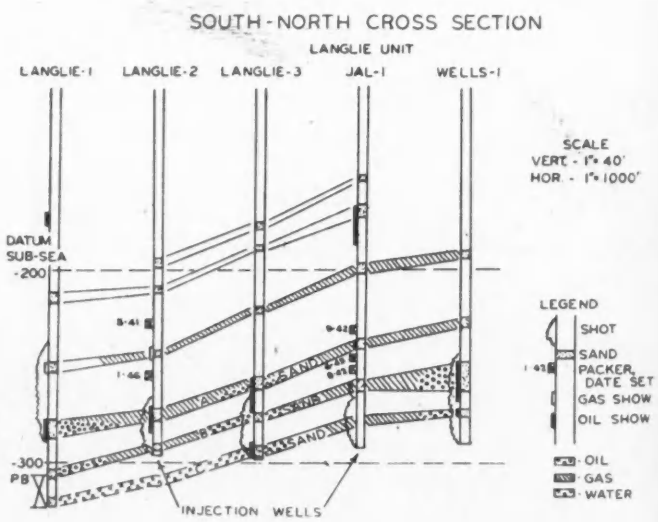

Figure 2. South-North cross-section, Langlie Unit.

Repressuring Project

By RALPH L. GRAY, Stanolind Oil & Gas Company, Hobbs, N. M.

drilling time in the absence of other dependable data. In general, the sands are indicated by soft drilling breaks, whereas dolomite drills considerably harder. Correlation of some of the sands is made difficult because of their lenticular character. The "A," "B," and "C" sands, as noted on cross-section, are the principal oil-producing sands, although there may be as many as five sands furnishing oil in some parts of the unit. It is thought that the "A" sand has been the most prolific and has the highest permeability; a large part of this sand is now highly saturated with gas. Just above sand "A" is a rather thin sand thought to be chiefly gas-saturated. However, this sand probably has some oil in the lower structural position such as a Langlie "A" 1 and 2, and Stuart 3. The cross-section indicates saturation conditions as they are believed to exist at this time.

Reservoir Performance

In five years of operation under gas injection, the average reservoir pressure has declined from 615 psi. to 467 psi., or a decrease of one psi. for each 2870 barrels of oil produced. Prior to gas injection, pressure was decreased from an estimated 1400 psi. to 615 psi. in about three years. This is a decrease of one psi. for every 863 barrels of oil produced. Figure 3 shows gas-oil ratio and bottom-hole pressure behavior, and oil and water production, for the entire unit. Shortly after injection of gas had been started, the average bottom-hole pressure actually increased, and for the first four years of operation practically no pressure decline was evidenced. Shortly after the compressors had been shut down in November, 1944, and gas injection had been stopped for two months, reservoir pressures decreased sharply.

Figure 4 shows the bottom-hole pressure history in the form of contour maps, indicating conditions for three-month intervals. The first three maps show a rapid change, indicating a readjustment to a new set of conditions. After one year equilibrium seems to have been established, and for the next three years a rather definite pattern is followed. Halting of gas injection for the last two months of 1944 undoubtedly caused a readjustment of pressure conditions, as is indicated on subsequent maps.

In the early stages of unit operation, the average gas-oil ratio increased rather sharply for one year, and then assumed a more gentle slope. During the past year remedial measures have been taken to lower gas-oil ratios by resetting packers in both injection wells and injecting gas into lower sands. The ratios were effectively lowered by this means. At the start of unit operation, the average gas-oil ratio was about 2000 cubic feet per barrel. After one year of gas injection, this increased to about 8600 cubic feet per barrel, and since that time maximum average gas-oil ratio has been about 14,000 cubic feet per barrel.

Figure 5 shows the gas-oil ratio history in the form of contour maps. This illustrates that in April, 1942, a definite pattern was established, which has been closely followed since. This was the establishing of a higher structure in the vicinity of Langlie 3 and 4 and Jal 2, and a higher structure surrounding Langlie "A" 1. A study of the contour maps makes it appear that a permeable channel connects Langlie "A" 1; Langlie 2, 3 and 4; and Jal 1 and 2.

Repressuring Benefits

To determine additional oil recovery due to gas injection, consideration was given to material-balance methods. However, because of a lack of accurate fundamental data and because of a complicated set of saturation conditions and multiple sands, it was decided that the most reliable approach would be through a comparison of unit wells' performance with wells adjacent to the unit to the north. Again, referring to Figure 1,

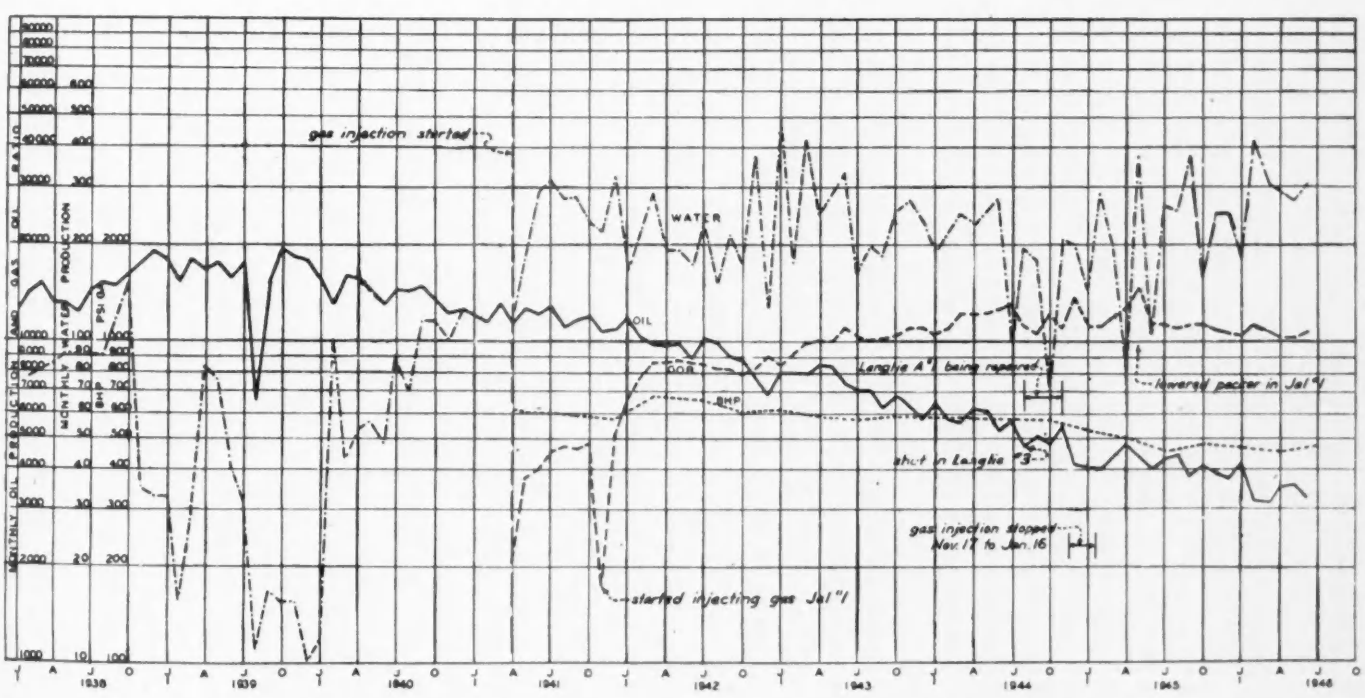

Figure 3. Gas-oil ratio, bottom-hole pressure; oil and water production—total Langlie Unit.

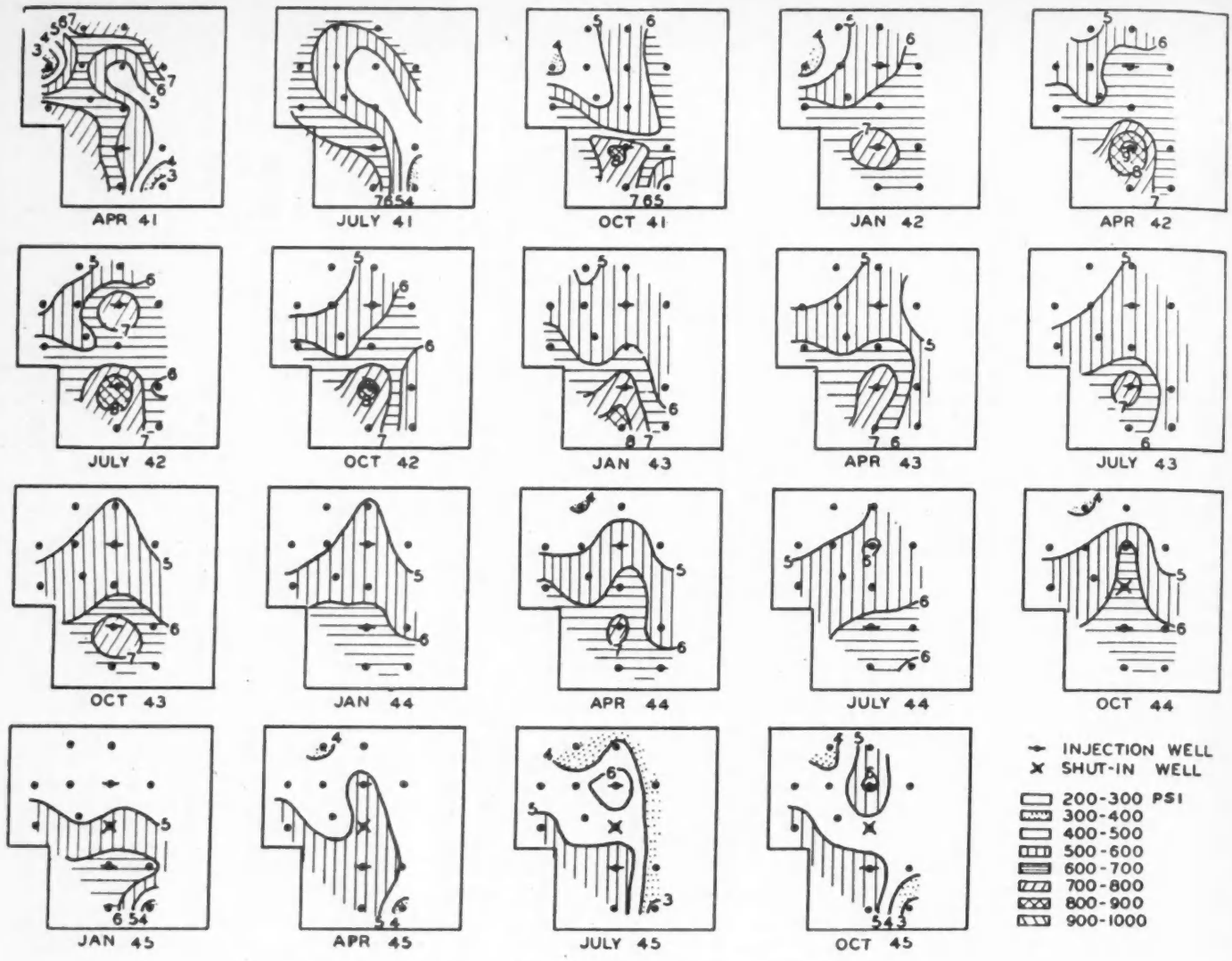

Figure 4. Bottom-hole pressure contour maps.

two areas north of the Langlie unit are designated as Group 1 and Group 2. These two groups, which are presently and always have been produced by primary means, were studied along with the unit to determine benefits due to injecting gas. Wells in all three groups produce from the same geological section of similar thickness and type. Group 1 comprises 14 wells; whereas Group 2 embraces 12 wells, of which two are non-productive. Average initial potentials in barrels of oil per day were:

Group 1, 267; Group 2, 546; Langlie unit, 335.

Figure 6 shows a comparison of monthly oil production for the Langlie unit, Group 1 and Group 2. The last well drilled in the unit was completed in August, 1939. The last wells to be completed in Groups 1 and 2 were in December, 1939. The heavy broken line at April, 1941, indicates starting of gas injection in the unit. Prior to injection, production curves merely correspond to allowables. However, shortly following this the producing capacity of most wells declined, and production curves represent the true ability of wells to produce. The production after June, 1946, is estimated. The calculated economic limits are shown as January 1, 1947, for Groups 1 and 2, and June 1, 1948, for the unit. After the study had been made, the price of crude was increased—which will prolong the estimated productive life as indicated. Many wells in Groups 1 and 2 are at the economic limit now, and two wells in Group 2 are no longer producing. Although some of the better wells in all groups will continue to be profitable after the economic limits indicated, these limits should be reasonable for the groups as a whole.

The unit curve reflects three periods during which oil production decreased noticeably. One is for December, 1942; one is for December, 1944, and January and February, 1945; and the third is for February and March, 1946. Records reveal (Figure 9) that during September and October, 1942, only slightly more than 50 percent of space voided was replaced by injection. This would suggest that perhaps the production decrease in December was a result of decreasing injection rates. During November and December, 1944, and January, 1945, the injection rates were greatly reduced due to compressors at plant having been out of service for a two-month period. As a result, oil production fell off noticeably for three months. Injections during January and February, 1946, were less than 50 percent of space voided, which was apparently responsible for the decreased oil production during February and March. This seems to confirm the assumption that production for the Langlie unit would have closely followed the trend of Groups 1 and 2 had not gas injection been inaugurated.

Coming Soon

A History of the Development of Carthage Field, Texas

Watch for It

CumulativeProduction

Figure 7 depicts cumulative oil production for the unit, as well as the estimated recovery under primary operation. Under primary operation it was assumed that production would follow the lower trend shown in Figure 6.

It is expected that the ultimate production of oil will be as follows:

By gas injection—1,178,864 barrels or 1840 barrels per acre.

By primary means—1,027,214 barrels or 1600 barrels per acre.

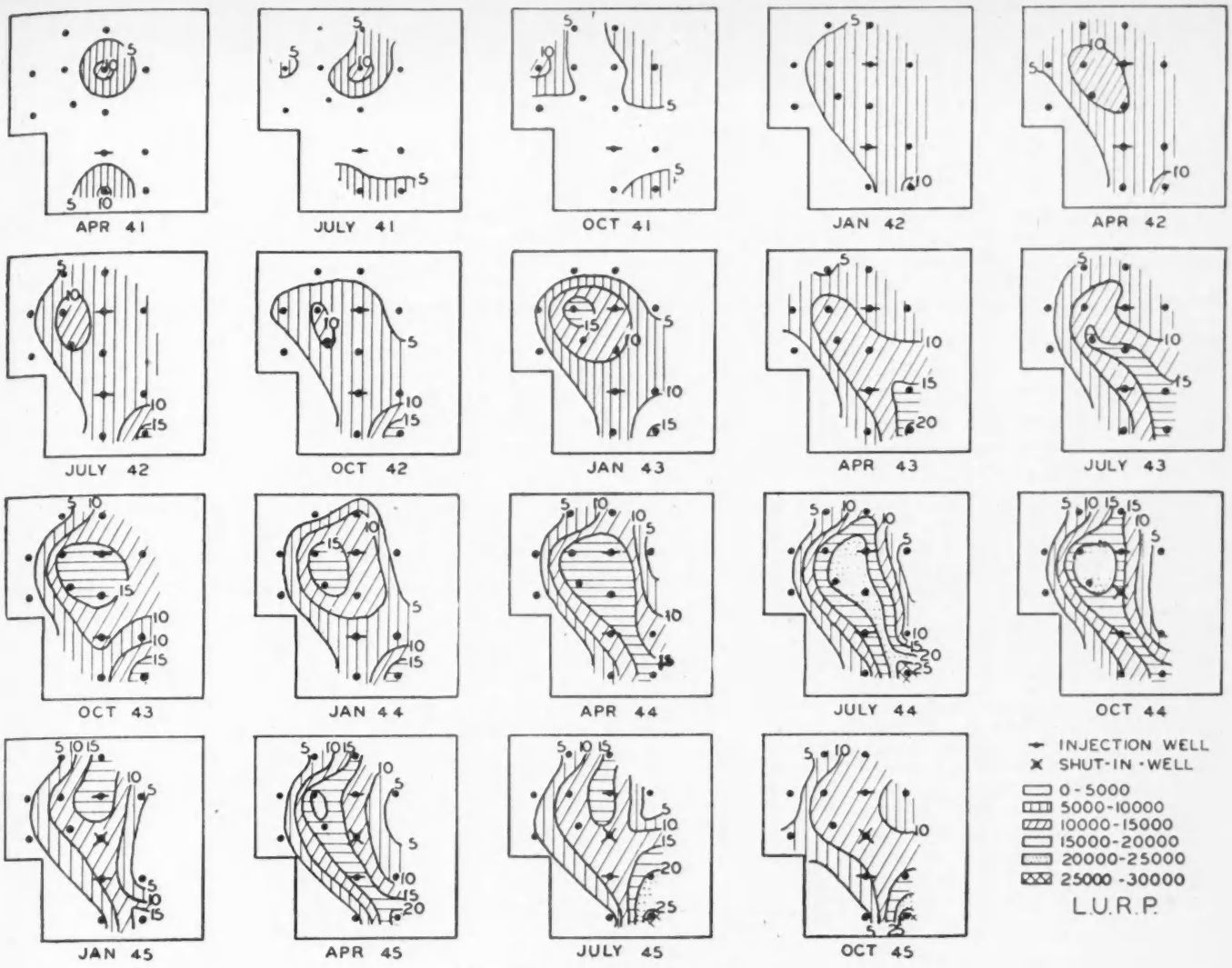

Figure 5. Gas-oil ratio contour maps.

Additional oil due to repressuring—151,650 barrels.

As of January 1, 1946, recovery by gas injection was 11.1 percent greater than primary operation, or 33 percent greater for injection period. Ultimately, it is estimated that recovery will be 14.8 percent greater than primary operation for entire life, or 43.3 percent greater for injection period.

Aside from increasing the recovery of oil, it is apparent that gas injection has materially reduced investment and operating costs. Following is a tabulation comparing the status of unit wells with Groups 1 and 2:

	Pumping	Gas-Lift	Flowing	Percent on Artificial Lift
Group 1	4	6	4	71.4
Group 2	1	4	5	50.0
LURP*	0	2	9	18.2

* Langlie Unitized Repressuring Unit.

By injecting sufficient gas to allow only a small pressure decline, it has been possible to delay the need for artificial lift, and in many cases the need for lifting equipment has been completely eliminated. In two cases, wells in the unit which were pumping prior to gas injection started flowing afterwards. Burleson 1 started flowing in April, 1942, and Langlie "A" 1 started flowing a few months after gas injection had been started.

Injection Program

Gas was first injected into Langlie 2. Before gas was injected, the well had been cleaned out to total depth. In the beginning, rate of injection was about 670 Mcf. per day under a pressure of 600 psi. This was later increased to about 1150 Mcf. per day under a pressure of about 900 psi. Gas injection was started in Jal 1 in November, 1941, after deepening through the "B" and "C" sands. From this time to September, 1942, gas was injected both above and below the packer set below the "A" sand. Most of the gas was injected above the packer at a pressure of about 900 psi. After October, 1942, gas was injected below a packer set above the "A" sand. Normal volumes injected were then about 830 Mcf. per day under a pressure of 650 psi. In June, 1945, the packer was reset below the "A" sand, after a packer point had been selected by taking a caliper survey. Gas was then injected at the rate of about 500,000 cubic feet per day and at a pressure of 700 psi.

Figure 8 shows average volumes and pressures of injected gas for total gas injected. In the lower part of Figure 8 a dotted curve is shown. This is the volume of gas produced in thousand cubic feet per month. A very interesting fact is developed in comparing this curve with the injected-gas curve. After October, 1941, injected-gas volumes increased sharply due to start of injection in Jal 1. Two months later this increase is reflected on the produced-gas curve. A low was shown for injected gas in October, 1942, after injection had been stopped for a 30-day period. The low was reflected on the produced-gas curve two months later. Other corresponding events can be compared in a like manner, and most indicate that changes in gas injection will be reflected in from one to two months in the amount of gas produced. Thus, we can state that it takes from one to two months for gas to travel from the injection wells to the offset producing wells where some channeling is occurring.

Most wells in the unit show a decrease in gasoline content of produced gas over the injection period. Changes are rather difficult to follow accurately, as normal seasonal changes are reflected in the gas content. However, the gasoline content of the average well apparently decreased about 0.4 gallon per thousand cubic feet of gas for the first

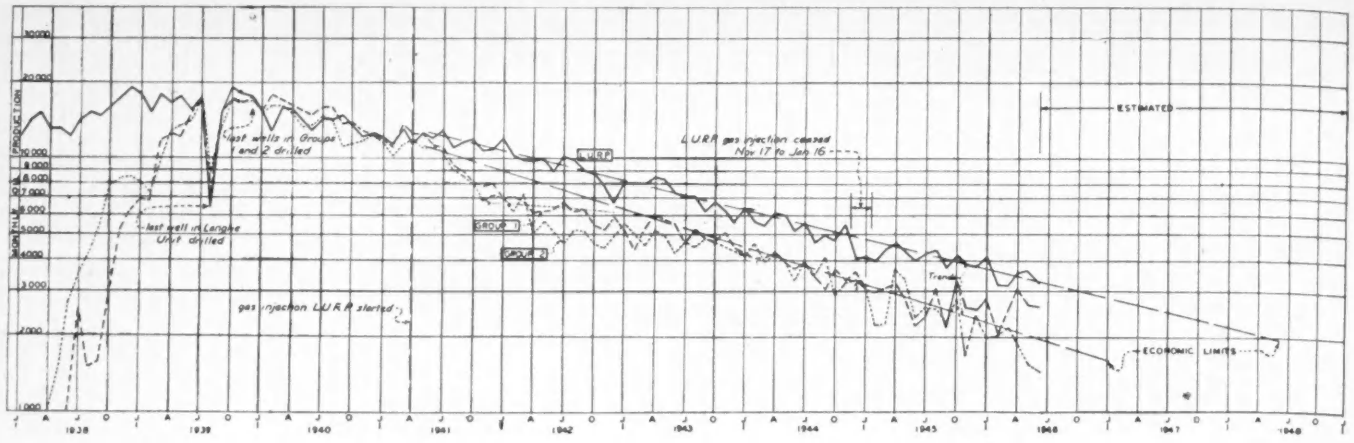

Figure 6. Monthly oil production. Three groups of wells in the Langlie area.

five years of gas injection. The maximum and minimum gasoline contents are 1.2 gallons and 0.5 gallon per thousand cubic feet, at this time.

Figure 9 shows three curves: One is cumulative injected gas; one is monthly oil production; and the other shows the percent of total space voided replaced by injected gas. It has previously been mentioned how decreases in oil production can be correlated with low void replacements of injected gas. A study of Figure 9 is really the key to establishing the correct rate of gas input. As a general rule, we can say that in this reservoir it is necessary to inject at least 70 percent of the total space voided in order to recover maximum oil production. Anything less than about 70 percent will result in a decrease in oil production.

Operation of Unit

The greatest problem in five years of operation has been in controlling gas-oil ratios. After a few months of operation, it became evident that some channeling of gas was occurring between injection and offset wells. The gas-oil ratio at Jal 2 increased from about 3000 to 15,000 cubic feet per barrel in nine months. Corresponding increases were noted at Langlie wells 3 and 4. Later, it was seen that some of the gas was probably being driven through some upper dry gas sands without coming in contact with oil sands. During the latter part of 1943 and early part of 1944, an attempt was made to lower gas-oil ratios by injecting crude oil along with injection gas to decrease permeability of formation to gas. Approximately one barrel of crude oil per day was injected over a period of three months without showing any effect on gas-oil ratios. In August, 1944, Langlie 3 was shut in to conserve gas. At this time it was producing with a gas-oil ratio of 25,000 cubic feet per barrel. The well was not opened until December, 1945, but little benefit was realized, as the gas-oil ratio was still 20,000 to 25,000 cubic feet per barrel, and daily oil production had declined from 15 to seven barrels of oil per day. The most successful method used in reducing gas-oil ratios was in lowering packer into Jal 1, and injecting gas below the "A" sand and lowering packer into Langlie 2 to inject all gas in "A" and "B" sands. As an example of benefits obtained from these changes, the gas-oil ratio of Jal 2 was lowered from 20,000 to 13,000 cubic feet per barrel. Ratios were also effectively lowered in Langlie wells 3 and 4. The greatest benefit from repressuring was obtained at Langlie "A" 1. At start of injection, this well produced eight barrels of oil per day by artificial lift. After six months of gas injection, the well flowed an average of 42 barrels of oil per day.

Conclusion

It is encouraging to those who are confident that gas injection is generally feasible and profitable to know that repressuring at the Langlie unit is proving successful. Here, gas drive is carried out under the most unfavorable conditions. All except one well have previously been shot through the pay section, making it difficult to control channeling gas. Although the unit would not have operated as satisfactorily if it had been necessary to install its own compressor plant, it must be realized that the same percentages of increase in oil recovery applied to a large field would yield a very profitable venture. Probably the most important figures developed are:

1. The recovery by gas injection will be 43.5 percent greater than primary operation for injection period, or 14.8 percent greater for entire life.

2. The unit now has 18.2 percent of wells on artificial lift, as compared to an average of about 60 percent on artificial lift on adjacent properties.

It is reasonable to expect that a more suitable type of reservoir, where packer control could be exercised efficiently, would yield much better results.

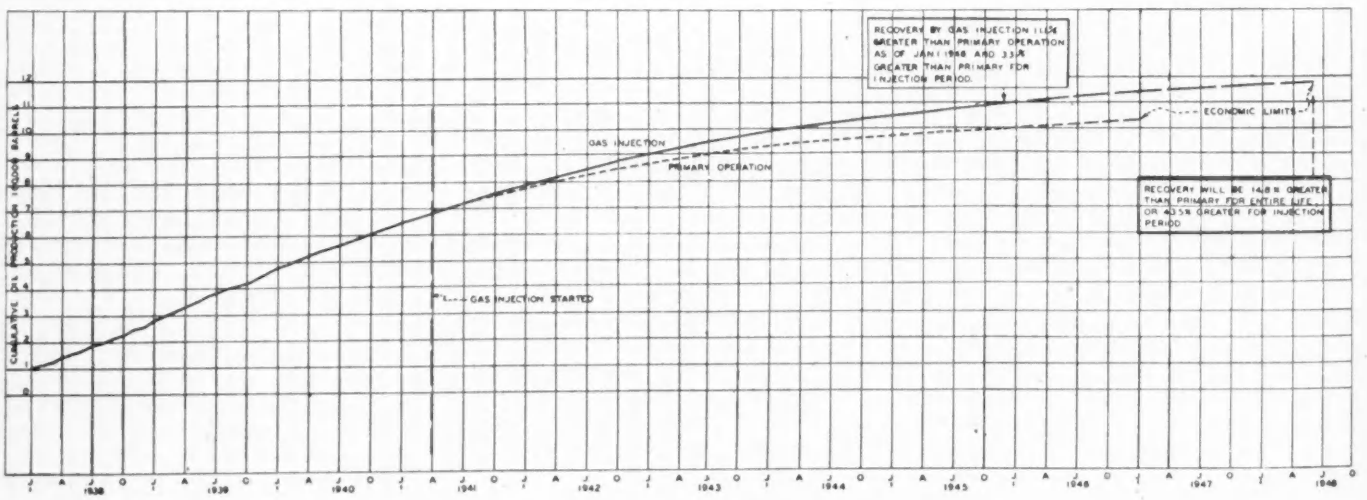
RECOVERY BY GAS INJECTION 14.8% GREATER THAN PRIMARY OPERATION AS OF JAN 1 1948 AND 33⅓ GREATER THAN PRIMARY FOR INJECTION PERIOD.
ECONOMIC LIMITS
GAS INJECTION
PRIMARY OPERATION
RECOVERY WILL BE 14.8% GREATER THAN PRIMARY FOR ENTIRE LIFE OR 43.5% GREATER FOR INJECTION PERIOD
GAS INJECTION STARTED
CUMULATIVE OIL PRODUCTION (000s BARRELS)

Figure 7. Cumulative oil production, Langlie unitized repressuring projects.

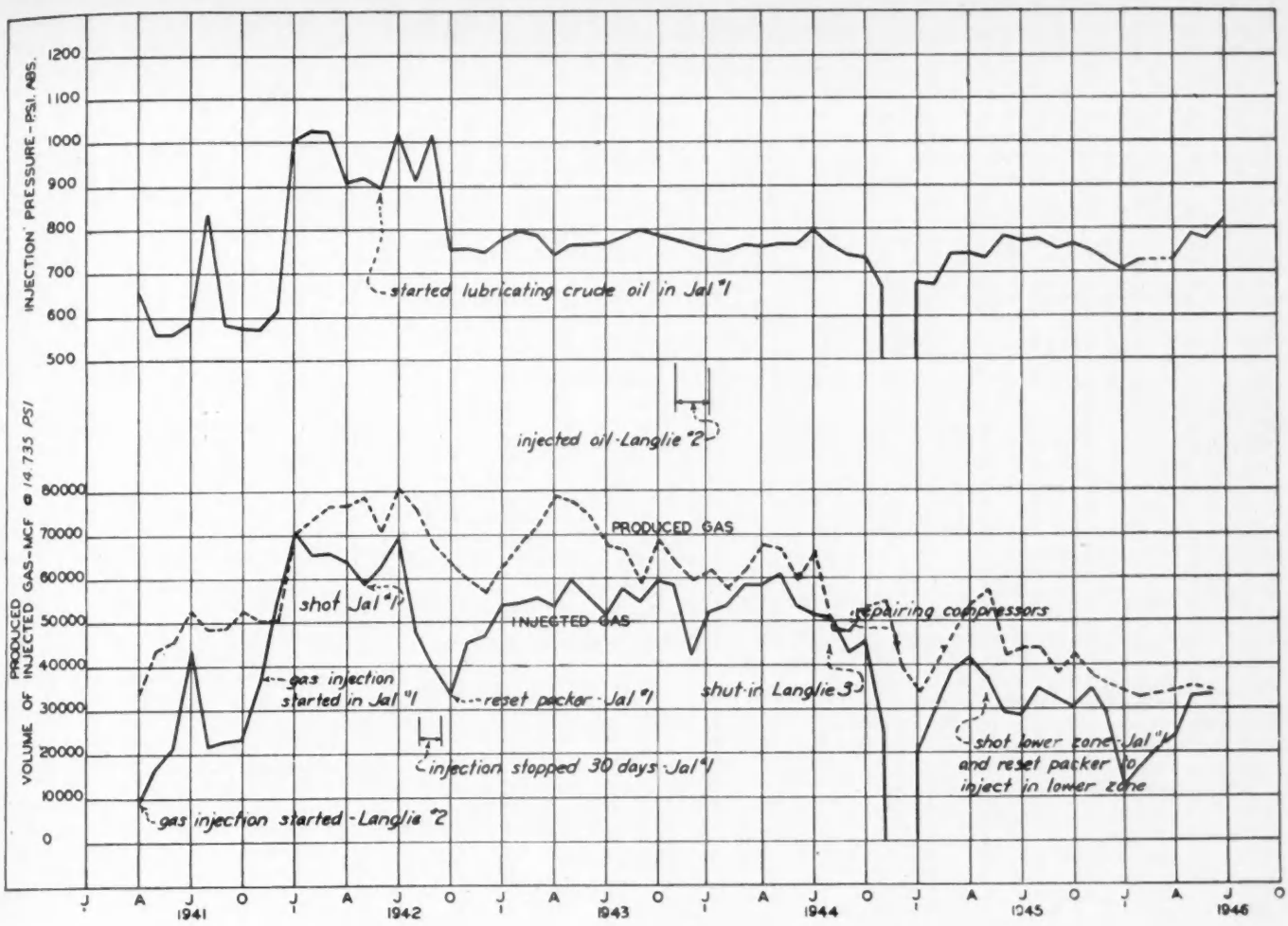
INJECTION PRESSURE - PSI. ABS.
VOLUME OF INJECTED GAS - MCF @ 14.735 PSI
PRODUCED
started lubricating crude oil in Jal #1
injected oil - Langlie #2
PRODUCED GAS
INJECTED GAS
shot Jal #1
gas injection started in Jal #1
reset packer - Jal #1
injection stopped 30 days - Jal #1
gas injection started - Langlie #2
repairing compressors
shut-in Langlie #3
shot lower zone - Jal #1 and reset packer to inject in lower zone
1941
1942
1943
1944
1945
1946

Figure 8. Gas-injection volumes and pressures, total unit.

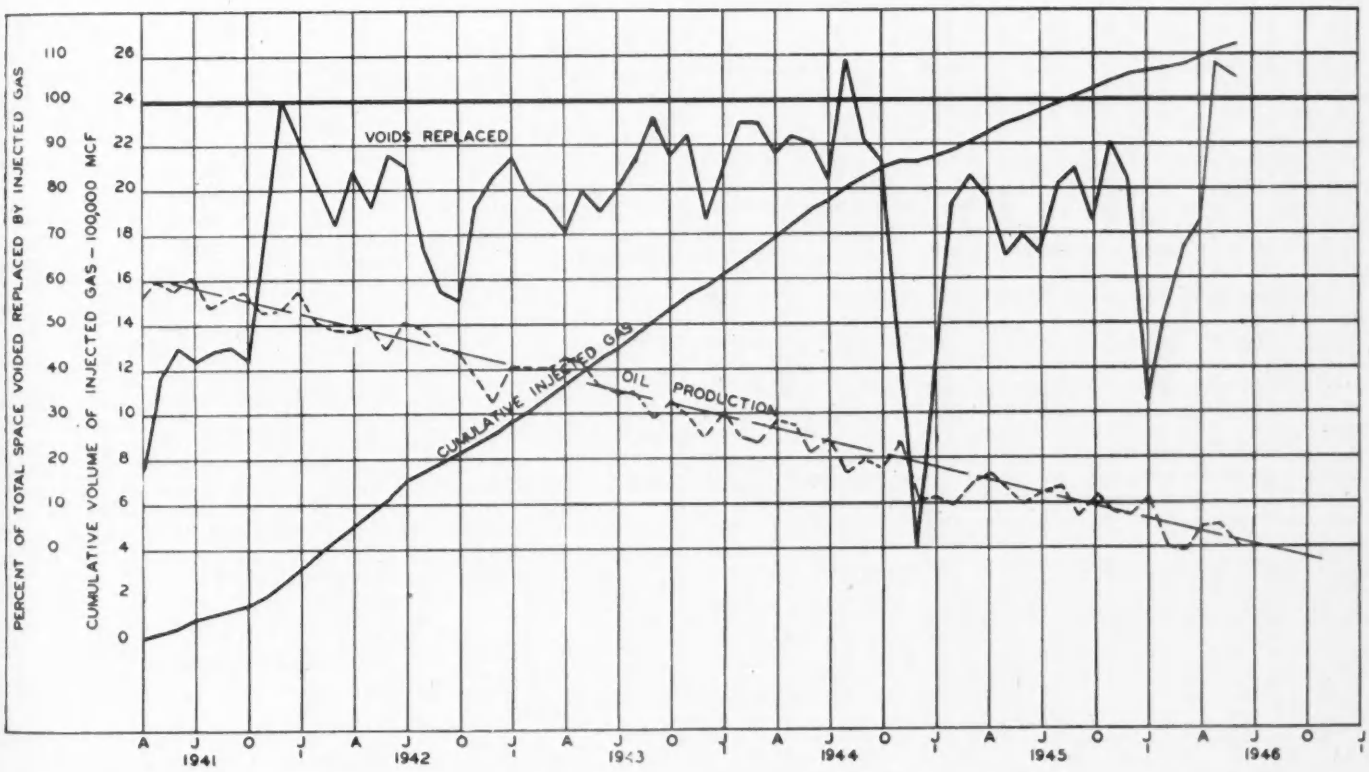

Figure 9. Cumulative injected gas, monthly oil production, and percent of total space voided replaced by injected gas—Langlie unitized repressuring project.

SOURCE AND PURIFICATION Of Gas

By L. L. McWILLIAMS, Phillips Petroleum Company, Bartlesville, Okla.

UNTIL recent years gas-injection operations were principally confined to sand pools. Entries are now being made into limestone and dolomite areas, largely in the Panhandle pool of Texas and the West Texas-New Mexico regions. These will be large unitized or cooperative projects, involving thousands of acres and the injection of enormous volumes of gas. Sour gas is a common problem in such projects. The sand projects have their problems of source and purification of gas, but the projects in the limestone-dolomite areas are presenting some difficulties which heretofore rarely came to the attention of the secondary-recovery engineer. This paper presents a general idea of the difficulties and the present known methods of purification to overcome them. The natural-gas and gasoline industries have encountered and overcome most of the purification problems. It is fortunate that the secondary-recovery engineer has the advantage of such experience.

Natural gas is the most widely used injection medium. Air has been used where there was an insufficient supply of natural gas, or where the price was excessive. The preponderance of evidence is against the use of air.

Some rarely used media are manufactured fuel and inert gas, engine-exhaust gas, and propane or butane hydrocarbons. The application of these media is so rare that further consideration is omitted.

Some undesirable gases may be present in the medium. These gases are hereinafter discussed.

The source of most gas for a project is usually from producing wells in the project. Quite often an outside source of "makeup" gas is required. In either case there are many items to be investigated with respect to a source of gas. The API Subcommittee on Secondary-Recovery Methods[4] has outlined the requirements to be investigated.

Undesirable Injection Media

The commonly recognized undesirable gases incident to gas-injection projects are hydrogen sulfide (H_2S), carbon dioxide (CO_2), oxygen (O_2), and water vapors.

Hydrogen sulfide occurs naturally in gas produced from pools in some parts of Texas, New Mexico, Arkansas, Louisiana, Wyoming, Illinois, and to a lesser degree in some other sections of the United States.

Carbon dioxide is probably prevalent to some degree in all natural gas. It may occur naturally in the reservoir, or be the result of oxidation of the crude due to air contamination. Its undesirability is insignificant compared with hydrogen sulfide.

Oxygen will be in the injection system if air is intentionally injected, or if air enters the gas-gathering system as a result of leakage with the application of vacuum. Tests of casinghead gas have at times indicated the presence of oxygen where it would seem impossible for it to occur, i.e., it occurred in new pools where the gathering system was under pressure. The oxygen may have originated in the reservoir, but this is not expected. The actual presence of oxygen may be due to the deoxidation of mill scale on the pipe, or perhaps other unsuspected cases. The apparent presence of oxygen could be due to improper testing or interpretation by an analyst.

Water vapors in the gas are undesirable, if under the right conditions the vapors condense and freezing trouble develops.

Difficulties Caused by Undesirable Gases

The difficulties experienced with undesirable gases in an injection medium depend on the undesirable gases present.

Air may enter the system, and certain disadvantages will result. Some work on the subject has been published by the U. S. Bureau of Mines.[2] Conclusions of tests were that, when crude oils were oxidized, the following results may be expected:

"1. Carbon dioxide (CO_2) is produced.
"2. Asphaltic materials and gums insoluble in the crude are formed.
"3. Acid values increase.
"4. Surface tensions remain virtually the same.
"5. Interfacial tensions decrease.
"6. Water-flooding tests with sand cores will indicate decreased production due to formation of emulsion.
"7. Tests of rates of flow of the oxidized oil through sand cores will indicate plugging.

"The magnitude of these changes depends upon:

"1. The chemical individuality of the crude.
"2. The degree of oxidation, which depends upon such factors as time, contact, temperature, and concentration of oxygen.

"In general, the resistance of the crude oils studied toward oxidation decreased in the following order: paraffin-base; intermediate-base; and naphthene-base."

When air comes in contact with equipment in the presence of water, corrosion can result. Iron oxide, or "rust," is often present. Rust may form on the oil string and drop into the input-well bore, thus causing plugging. Leaky casing and the possible intrusion of water into the input well can develop.

Others,[3,4,5,6,7] have covered the subject of air injection, giving some actual field observations.

Severe difficulties can develop when hydrogen sulfide is present in the injection media. The U. S. Bureau of Mines[8] has made several conclusions regarding corrosion of steel by gases containing traces of hydrogen sulfide, some of which are listed:

"Two forms of corrosion have been identified.

"A. A less serious form, ordinary gaseous corrosion, in which no precipitated water is present on the surface of the metal, although the gas may be saturated with water vapor.

"B. A severe form, modified gaseous corrosion, in which precipitated water is present on the surface of the metal.

"Pressure accelerates the reaction in both forms of corrosion, but this effect is particularly noticeable with modified gaseous corrosion.

"The 'corrosion threshold concentration' of hydrogen sulfide, or the amount necessary for producing severe corrosion, is lower for modified gaseous corrosion than for ordinary gaseous corrosion.

"Modified gaseous corrosion appears to be the result of an electrochemical reaction, while ordinary gaseous corrosion has the characteristics of a chemical attack."

It is important that the production of hydrogen-sulfide gas, and the attendant difficulties, are not restricted to the so-called "sour" fields; e.g., some acknowledged "sweet" fields have contained small quantities of hydrogen sulfide, which is not readily detectable, in the magnitude of 0.1 to 5 grains per 100 standard cubic feet.

Difficulties arising with the occurrence of hydrogen sulfide might be observed not only as corrosion of equipment, but also a tendency toward plugging of the input-well bore, caused by an accumulation of material resulting from corrosion or free sulfur.

The secondary-recovery engineer is interested in the degree of corrosion that would be caused by the occurrence of hydrogen sulfide in the injection medium. The U. S. Bureau of Mines[8,9] has published experimental data which should be helpful in estimating the life of pipe lines carrying sour gas.

Carbon dioxide is classed as an undesirable gas. It is mildly corrosive in the presence of water at temperatures and pressures normally found in secondary-recovery projects. It is considered only insofar as its removal is often necessary along with the removal of hydrogen sulfide in natural gas.

Freezing troubles, which develop from the condensation of water vapors, present costly field difficulties. Input service is disrupted. The thawing process is usually hazardous, and gas must often be wasted to the atmosphere by the blowing of lines. Most of the freezing troubles develop from the formation of gas hydrates, which are hereinafter discussed.

Testing for Undesirable Gases

The need of testing for undesirable gases would arise in a new project where the data are required to determine what, if any, purification is necessary; and for determination of the cause of trouble and possible elimination in an active project.

Supply

THIS paper covers the types and sources of gas for injection. It lists the undesirable gases which sometimes occur in the injection media, and describes the difficulties these undesirable gases will cause. The paper outlines the methods of testing for the undesirable gases and the present known methods to purify by eliminating or reducing the difficulties encountered. Finally, the report deals generally with the economics of purification.

L. L. McWilliams

(Presented before the Division of Production at the 26th annual meeting of The American Petroleum Institute, Stevens Hotel, Chicago, November 12, 1946.)

Hydrogen sulfide is measured in terms of grains or percent by volume. One grain weighs $\frac{1}{7000}$ of a pound. Or 634 grains (some use 630 to 636) per 100 standard cubic feet of gas is equivalent to 1 percent by volume. Carbon dioxide and oxygen are measured in terms of percent by volume.

Methods of testing are as follows:

Hydrogen Sulfide

The API code[10] recognizes two methods for the testing of hydrogen sulfide:

A. *Tutweiler methods*[11]: For analyzing natural gases where the hydrogen-sulfide content is in excess of 20 grains per 100 cubic feet of gas. The so-called 100-millilitre Tutweiler is recommended in the API code for these measurements. However, a 500-ml Tutweiler is sometimes used to measure hydrogen-sulfide content in the range of 1 to 20 grains per 100 cubic feet of gas.

B. *Cadmium-sulfate method*[10]: For analyzing natural gases where the hydrogen-sulfide content is less than 20 grains per 100 cubic feet of gas, although it may be used in place of the Tutweiler method for higher content.

For a quick qualitative field test, the lead-acetate method may be used. Moist lead-acetate paper is exposed to the gas for testing. If hydrogen sulfide is present, the paper will be discolored—turning light brown to black, depending on the hydrogen-sulfide content and the length of time exposed. Some mercaptans may produce a yellow color, but will disappear in a short time if exposed to sunlight.

Carbon Dioxide and Oxygen

The Orsat apparatus[11] is commonly used for determining carbon-dioxide and oxygen content. The method is recognized in the API code.[10] The principle of this method is to pass a given quantity of gas first through a solution of potassium hydroxide to remove the carbon dioxide. Next the gas is passed through a solution of alkaline pyrogallol to remove the oxygen. Both the oxygen and carbon dioxide are measured in terms of percent by volume. Air content of the gas can be determined as 5 times the oxygen content. If hydrogen sulfide is present in the gas, it will be removed in the testing process along with carbon dioxide. Consequently, the percent of hydrogen-sulfide content must be determined by one of the methods previously discussed and deducted from the carbon-dioxide-hydrogen-sulfide content found by Orsat analysis.

It is important that the analyst correctly make the Orsat analysis. Some of the common errors are air contamination in the sampling of the gas, improper preparation of the alkaline-pyrogallol solution, and interpretation of absorbed heavier hydrocarbons as oxygen by an inexperienced analyst.

Water Vapors

Gas as it emerges from a producing well, or from a gasoline plant or booster station (before dehydration), is generally conceded to be fully saturated with water vapors. The water vapors will condense with a reduction of temperature or an increase of pressure. The temperature at which liquid water begins to form is termed the "dew point." Under certain conditions of pressure and temperature the condensed water vapors may freeze. Usually most freezing troubles result from the formation of gas "hydrates," as they may form far above the freezing point of pure water. By way of explanation, a hydrate[12] may be defined as a chemical compound in which water is present in fixed and simple molecular proportions. The natural-gas hydrocarbons that will form hydrates are methane, ethane, propane, and *iso*butane.[12] The natural-gas hydrates will be solid compounds resembling snow or ice in appearance. The chemical formula for a gas hydrate—e.g., of propane—is $C_3H_8 \cdot 6H_2O$.

The actual taking of dew-point measurements is seldom required. Physical measurements are made by the U. S. Bureau of Mines' dew-point apparatus[14]—the dew point being determined under pressure.

The secondary-recovery engineer often has the typical problem of determining if hydrate trouble will develop when natural gas, as the injection medium, leaves a gasoline plant or booster, and is conveyed through a distribution system to input wells. The determination can be made by actual computation. Katz[13] has presented a simplified approximate method involving the use of graph data. The data are especially helpful, as the graphs cover a range of gas gravities from 0.6 to 1.0. One of the graphs presented by Katz illustrates the conditions of temperature and minimum pressure where hydrates will form, provided sufficient water is present and the mixture is at equilibrium. The following tabulation, derived from the Katz data, illustrates several conditions where hydrates would form:

Gas Gravity	Temperature (Deg. F.)	Pressure Above which Hydrates Will Form (PSI, Absolute)
0.6	32	145
0.6	50	475
0.6	70	2,400
0.8	32	75
0.8	50	275
0.8	70	1,800
1.0	32	50
1.0	50	195
1.0	70	1,350

Katz has presented other graphs to illustrate the permissible expansion of natural gas of varying gravity, without hydrate formation.

Methods of Purification

There are a number of methods to purify gas by desulfurization and dehydration. Some have an application in secondary recovery; the others are practically obsolete, or are expensive and have only limited application. The various methods are discussed as follows:

Desulfurization—Batch Methods

A. *Caustic soda:* The gas is bubbled through a solution of caustic soda (sodium hydroxide) to remove hydrogen sulfide. Usually no attempt is made to regenerate the foul solution. The method is expensive, and is confined to low-volume treating, e.g., in field camps.

B. *Iron oxide:* In this process the gas stream is passed through a tower containing a bed of sponge iron or its equivalent. A small amount of soda-ash (sodium-carbonate) solution is usually passed through the bed to keep it moist and to aid in removing hydrogen sulfide. The iron oxide deoxidizes into iron sulfide. The process is sometimes regenerated by blowing the tower with air or exposing the iron sulfide to the air. The process is somewhat hazardous during the regeneration step. It is one of the earlier methods of desulfurization, and has a limited application. Other methods are better adapted for secondary-recovery work.

Desulfurization—Continuous Methods

The methods are essentially alike except that they involve the use of a different chemical. In this type process a liquid chemical is continuously circulated through an absorber tower where it contacts the sour gas. The foul solution is regenerated usually by heating to remove the hydrogen sulfide, but in some instances by aeration. The various types of chemicals are covered as follows:

A. *Lime-salt (calcium-hydroxide and sodium-chloride) solution*[16]: A solution of lime alone will remove hydrogen sulfide from natural gas, but the solubility of lime in water is small; thus, it is advantageous to use a solution of salt and lime, as a greater amount of lime can be brought into contact with the gas. This is one of the earliest developed methods, and is not in general use.

B. *Soda-ash (sodium-carbonate) solution*[25]: The absorption of hydrogen sulfide results in an increase in the sodium-

bicarbonate and sodium-hydrogen-sulfide concentration in the solution, and a decrease in the carbonate concentration. The foul solution is usually regenerated by the use of an actifier in which air or steam carries off the hydrogen sulfide, together with a small amount of carbon dioxide originally absorbed from the gas. To remove virtually all of the hydrogen sulfide usually requires two stages of treating. There are a number of installations of this type of desulfurizer in use.

C. *Sodium phenolate*[17]: Sodium-hydroxide-alkaline solution, by the addition of certain acid phenols, becomes sodium phenolate. In the treating process the sodium phenolate combines with the hydrogen sulfide to form sodium hydrosulfide and phenol. The reaction is reversed by the application of heat, and the hydrogen sulfide can be liberated. The use of a solution, containing in combination an absorption agent (sodium hydroxide) and an auxiliary acidic constituent (phenol), permits a wide flexibility in the choice of solution for any given set of operating conditions. A two-stage process has been recommended in cases where virtually complete removal of hydrogen sulfide is required. The use of sodium phenolate is an advancement over the soda-ash method.

D. *Amines*[18]: The amine groups in general use are as follows:

Monethanolamine (*MEA*)
Diethanolamine (*DEA*)
Triethanolamine (*TEA*)

The compounds will combine with hydrogen sulfide to form amine hydrosulfide. The reaction is reversible with the application of heat to the foul solution, and the hydrogen sulfide can be liberated. Carbon dioxide is also removed. The amine compounds have different characteristics as to reacting capacity, decomposition temperature, heat required for regeneration, and selectivity to hydrogen sulfide instead of carbon dioxide. When air enters the system, the oxygen in the air chemically combines with the hydrogen sulfide in the amine solution to form stable amine—thiosulfate. This compound will in time accumulate to sufficient concentration to reduce the efficiency of the amine solution. This difficulty should be foreseen, and proper equipment can be installed in conjunction with the desulfurizer to overcome this situation. The virtual removal of hydrogen sulfide by the use of amines may be accomplished in one stage. The preponderance of installations of the amine-type desulfurizer, in place and planned, indicates a preference to this method.

In any type of treating installation it may be preferable to desulfurize the gas at the inlet of the gasoline or booster plant in order to reduce or eliminate corrosion of boosting equipment.

Operating cost for desulfurization is approximately the same for treating either at the intake or discharge pressure. As for installation costs, larger but thinner wall vessels and low-pressure equipment can be used for low-pressure installations, compared to smaller but thicker wall vessels and high-pressure equipment for high-pressure installations. Consequently, from the standpoint of installation costs, it is a question of economics in determining the treating pressure. In many instances installation costs are about the same for either high- or low-pressure treating.

Desulfurization should always precede dehydration except in the special case of combination[18] desulfurization and dehydration, as hereinafter discussed.

Elemental sulfur has been recovered, and sulfuric acid made and sold commercially from the hydrogen sulfide segregated in the treating process. The problem is not within the scope of this paper.

Dehydration

The objective of dehydration is to lower the dew point of the gas to where freezing of hydrates or free water will not occur. Prevention of freezing may sometimes be accomplished without dehydration by other means as follows:

1. Use of hot gas direct from the booster without cooling: The method has an application in many instances. The application is best in warmer climates, with short distribution lines, in the lower pressure range, with least pressure drop at input wells, and with a sizeable volume to keep the distribution lines warm.

2. Improved cooling of the gas to remove water: In instances where gas leaving the booster is cooled, the application of more water over the cooling coils and the use of more coils may remove enough water to prevent or reduce hydrate formation.

3. Additional compression, cooling, and expansion to desired line pressure: In some instances shutdown booster equipment can be used to raise the discharge pressure so that, upon cooling, additional water is removed which sometimes may be sufficient to prevent hydrate formation.

4. Installation of heaters at or near points where freezing occurs: This practice is being applied in many places, using hot-water heaters or open flame on lines.

5. Expansion of gas downhole at the input well by the use of bottom-hole chokes: The method takes advantage of heat in the formation to warm the gas.

6. Burying of distribution lines and protection of surface connections from exposure: This procedure has a good feature, in that it may sometimes provide the necessary measure to prevent hydrate formation. If lines are buried and freezing occurs, the thawing process by the direct application of heat becomes difficult, as the lines usually must be uncovered. If the topography of the surface is rocky soil where water can accumulate around the line, burying of the lines often is not advisable.

7. Use of drips to remove water and heavier hydrocarbons: This procedure is advisable as long as the value of any gas vented to the air does not exceed the cost of reducing or eliminating hydrate difficulty by some other method.

8. Thawing of lines when freezing occurs: This method may be applied where freezing difficulties are not too severe and occur only at periodic intervals. Some operators use a direct flame for thawing. Such a practice can be hazardous.

9. Injection of a chemical into the gas stream to lower the hydrate-forming temperature of the gas: Hammerschmidt[19] has presented helpful information in this respect. The effectiveness of several aqueous solutions of anti-freeze compounds was analyzed; e.g., ammonia, methanol, ethanol and calcium chloride, *n*-propanol, ammonium bicarbonate, acetone, and pure water. Ammonia appeared to be outstanding in its anti-freeze properties. However, ammonia will react with carbon dioxide in the presence of water to form a carbonate of ammonia which is a relatively poor anti-freeze compound. Another disadvantage is that aqueous solutions of ammonia are corrosive to brass. Methanol (wood alcohol) is an effective anti-freeze compound; is non-corrosive; it does not react chemically with any constituent of the gas; is soluble in all proportions with water; is readily procurable and reasonable in cost; and is 100 percent volatile under pipe line conditions, so that a solid residue cannot be deposited if partial or total vaporization of the liquid in the line takes place. The other anti-freeze compounds were less effective than methanol. Hammerschmidt has presented some practical applications for anti-freeze compounds, and supplied some useful graphical data.

10. A combination of more than one of the foregoing methods often has an application.

There are a number of drying agents and dehydration processes which could have an application in secondary-recovery work. Hammerschmidt[20] groups several methods as follows:

1. *Liquid absorbents*
   - Lithium chloride
   - Dow-8A (calcium bromide—calcium chloride)
   - Zinc chloride
   - Diethylene glycol,[21] 96 percent
   - Calcium chloride, 40 percent; glycerin, 20 percent
   - Glycerin, 85 percent
   - Calcium chloride, 40 percent
2. *Solid absorbents*
   - Calcium-chloride lumps
   - Potassium-hydroxide lumps
3. *Solid adsorbents*
   - Silica gel
   - Activated alumina
   - Anhydrous calcium sulfate (drierite)
   - Florite[22] (bauxite)

Dehydration using liquid absorbents involves a process wherein the gas stream passes through a tower, and there contacts a stream of liquid chemical which absorbs a portion of the water in the gas. The absorbent is then regenerated by heating to remove the water, and is cooled for reuse. The liquid absorbents each have different characteristics as to ability to reduce the dew point of the gas, corrosion of equipment, affinity for hydrogen sulfide, and cost of the chemical. Calcium-chloride brine and diethylene-glycol solutions are the two liquid absorbents which are being used most frequently on high-pressure natural-gas systems.[20]

The use of solid absorbents (not to be confused with solid adsorbents) for large-scale dehydration operations is so rare that no discussion is devoted to them. Solid adsorbents, commonly termed desiccants, depend upon a physical attraction between the adsorbent and the water condensate. Practically all water vapor can be removed. The method normally involves the use of two or more towers filled with the desiccant. This is a batch process; and, when the desiccant in one tower has adsorbed a reasonable amount of water, the gas stream is passed through a fresh tower. The spent desiccant is regenerated by heating with steam coils, or passing preheated gas through the tower to remove the adsorbed water. Temperature of the gas before dehydration is an important factor. Temperature of 80° F. or less is advisable to reduce load on the dehydrator. Dehydration instal-

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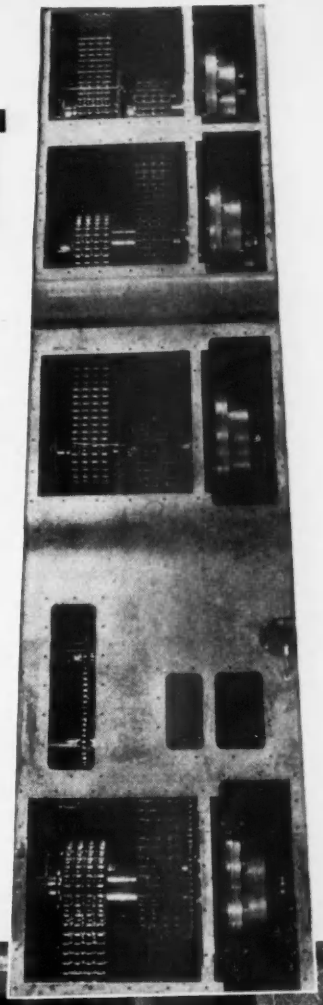

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lations using solid adsorbents are common.

Installations utilizing liquid adsorbents have best application in the pressure range below 500 psi. At higher pressures sufficient dew-point depression usually cannot be obtained. Solid adsorbents have no pressure limitations.

There is a question as to whether solid desiccants, of the bauxite type, can be successfully used in the dehydration of sour gas. In one instance almost pure hydrogen sulfide is being successfully dehydrated. In another case the desiccant became plugged with sulfur. The gas contained air, so it is evident that hydrogen sulfide was oxidized to form water and free sulfur. In another instance the desiccant also became plugged with sulfur. However, at all times the gas was under pressure from the time it left the producing wells, so that air had no chance to enter the system. This phase of the dehydration problem yet requires some research.

A combination "glycol-amine"[18] installation is sometimes used to accomplish dehydration and desulfurization in one step. Such installations are satisfactory within a specific range of pressure and requirements for dew-point depression of the gas.

No inexpensive method has been devised to remove oxygen in contact with natural gas. The best procedure is to prevent its entering the system. This may be accomplished by operating the plant and system under a pressure. Oxygen can be reduced by prudent policing to eliminate leaks in the vacuum system. Water testing of lines to locate leaks is sometimes advisable. The exclusion of oxygen from a system handling sour gas is especially important.

General Economics of Purification

The following information should be determined with respect to a purification problem:

1. Size of project.
   a. Location of input wells.
   b. System of lines in place or planned.
   c. Volume of gas for input.
2. Test data.
   a. Hydrogen-sulfide, carbon-dioxide, and oxygen content of input gas (maximum condition).
   b. Fractional analysis of input gas.
   c. Discharge pressure and temperature of gas leaving gasoline plant or booster.
   d. Pressure base.
   e. Plant-volume variation.
   f. Ground- and atmospheric-temperature variation throughout year.
   g. Input-well pressures.
3. Plant facilities.
   a. Electrical and cooling equipment, water and steam supply, available for use with purification facilities.
   b. Plant labor available to operate purification facilities.
4. Desulfurized-field and plant-fuel requirements.

The test data should first be obtained and analyzed to determine if any purification is required. If it is found that corrosion or hydrate trouble will develop, an economic analysis should be made comparing the cost of purification to cost without purification, i.e., the cost of replacing lines and repairing wells where the trouble is caused by hydrogen-sulfide corrosion, and the cost of overcoming freezing difficulties.

The cost of purification for desulfurization and dehydration can be quite variable, depending upon the conditions incident to each project. A few simple rules will apply:

The operation of purification facilities in conjunction with a gasoline or booster plant is far cheaper than separate operation.

Operating labor is a major item of expense. The operating expense for dehydration does not rise proportionately with the volume of gas purified. In the case of desulfurization, operating expense does not rise proportionately with acid-gas content, or with the volume of gas purified. The same reasoning applies to installation costs. The following tabulation illustrates for general purposes the cost (including amortization of equipment) of desulfurizing gas for variable conditions of gas-volume and acid-gas content.

Total Desulfurization Costs in Cents Per 1000 Cubic Feet

Acid-gas content, per-cent by volume.....	1.0	3.5	6.0
Equivalent H_2S content, grains per 100 cu. ft..	680	2200	3800
Volume, Millions of Cubic Feet Per Day			
10	1.8	2.3	2.8
50	0.9	1.3	1.8

The foregoing estimated costs may be increased or decreased depending upon the degree that local utilities, labor, and supervision of an adjacent gasoline or booster plant can be used in conjunction with the desulfurizer. Lead variation will also influence these cost data.

Desulfurization costs will rise sharply for volumes below 10 million cubic feet per day, and may vary from 3 to 10 cents per 1000 cubic feet, depending on volume, acid-gas content, and other factors previously listed. A major reason for this sharp increase is the fact that almost no decrease in labor can be made, and there is a disproportionate decrease in investment costs.

The formation of large projects is advisable to obtain a lower cost per unit volume of gas. Conversely, the cost of purification in many potential small projects is so high that gas-injection possibilities are out of the question.

The determination of purification design and the estimation of operating and investment cost is a specialized art. Trained specialists are usually found with the natural-gas and gasoline industries or consulting firms. The secondary-recovery engineer normally will have to rely on such experts for proper guidance.

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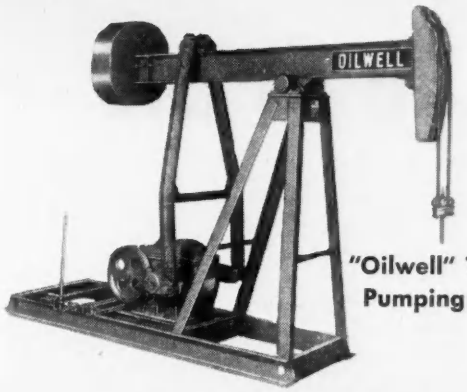
Storage and Treatment Data Given at Water-Flood Session

Data on the storage and treatment of oil were presented to more than 100 engineers and oil operators interested in water-flooding in Northeastern Oklahoma and Southeastern Kansas at a meeting sponsored by producers promoting secondary-recovery work in the area. The meeting, at which Norman Maxwell of Cities Service Oil Company, Bartlesville, Okla., presided, was held at Independence, Kansas.

Clarence Glasgow of the National Tank Company, described the types of tanks used for oil storage and asserted that the bolted tank is the cheapest for the purpose and is universally used on account of its portability. He pointed out that welded tanks, which had been commonly used before the war, offered the following advantages over the bolted tank: (1) longer life; (2) capable of operating at pressures of one pound per square inch against two ounces per square inch for bolted tanks; (3) more tightly constructed which decreases gravity loss.

In preparing an oil treating system, J. B. Robinson of the Tretolite Company, declared that consideration must be given to (1) length and capacity of the lead line; (2) extra capacity needed in gun barrel or treating tank; (3) necessity of using flumes or boots; (4) settling time needed, and (5) application of heat. These points being given due consideration the operator can obtain better oil with less treatment.

Robinson described two methods of chemical treatment commonly used—the in-hole treatment and the injection of chemicals into lead lines.



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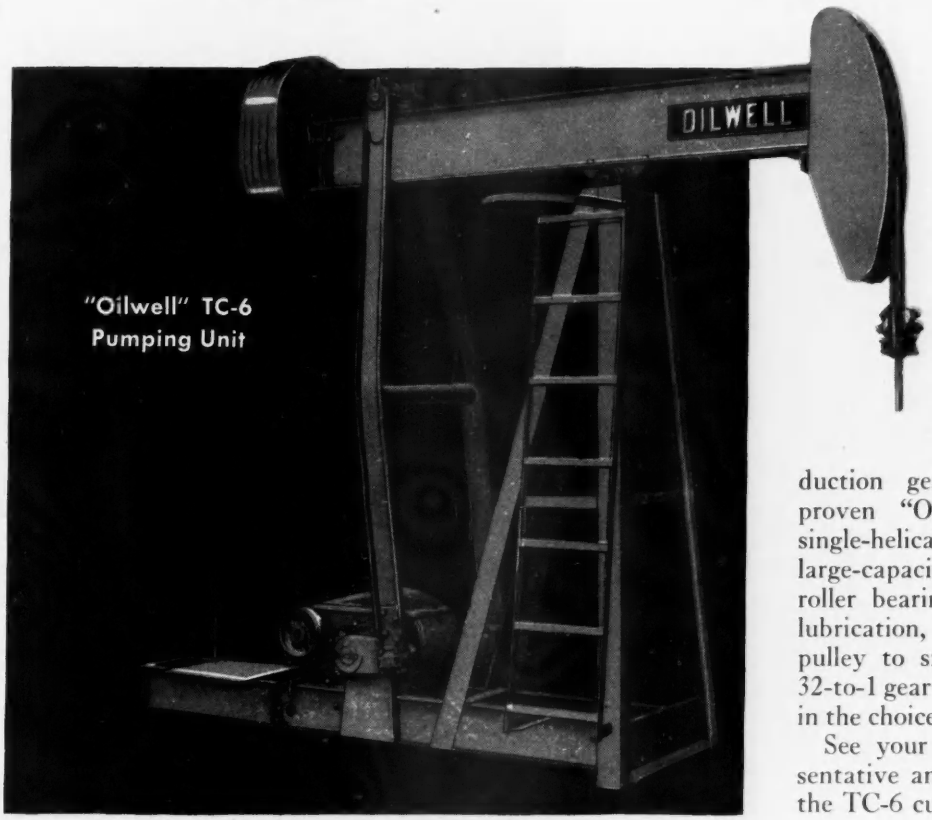

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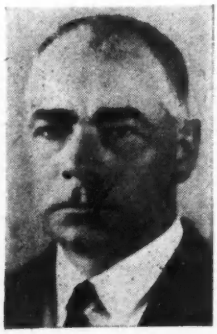

By J. HOWARD PEW, President,
Sun Oil Company

AMERICAN oil men can take justifiable pride in the progress, the good human relations and the record of public service which our industry has demonstrated over the last 50 years, both in peace and war.

We, likewise, can rejoice over the bright outlook for our industry that appears on the horizon of tomorrow. Internally, our industry today is better equipped to fulfill the opportunities of the future than ever before in its history. We have, without doubt, ample crude supplies to meet all domestic requirements for the foreseeable future.

Our technology has advanced to heights undreamed of a dozen years ago and promises even greater achievements in the years ahead. Our markets show prospects of steady expansion as long as we continue to provide consumers with top quality products at reasonable prices. Most important of all, our initiative and our spirit of competitive enterprise burns with undiminished fervor. Our heads are unbowed. We remain unconquerable rugged individualists and, of that, we are proud.

Blighting Shadow

Appearing also on that horizon, however, is a shadow with potentialities of evil that threatens to destroy all the bright hopes which our industry cherishes for many more years of continued service to the American people. It is a shadow cast by a fabric of international agreements and undertakings, now being woven in discussions and proposals which may become a strait jacket for world trade.

Not all the threads are yet in place, so none can speak with assurance as to the final result. The weavers, in clamorous voices, disclaim any evil intent. They proclaim their only purpose is to produce peace and prosperity. But the nature of the pattern which they are following has its origin in the collectivism and managed economy of the supreme, all-powerful state. The product of their handiwork will possess in time the characteristics of this pattern, unless a new approach is taken before the threads are woven together.

Underlying the current multitude of proposals in behalf of so-called international economic collaboration is the concept that foreign trade no longer can be left to the enterprise of individuals but must be controlled and directed by governments as instruments of national policy.

There is nothing new or progressive about this idea. It is a revival of the reactionary mercantilism of the eighteenth century—the system under which the kings of that time and their nobles sought to impose monopolistic restraints of trade upon the world.

Our American Revolution was fought to throw off the shackles of mercantilism. Inspired by that success, the European nations, too, turned loose the initiative of men and in the nineteenth century they recorded their greatest economic progress.

But out of Germany came a movement back to the principles of mercantilism. It was a movement fashioned in the diabolical brain of Karl Marx and given form and force by Bismarck. Its aim was control by the all-powerful state over the economic affairs of men through cartels, government trading, edicts and directives. Soon men's political and personal activities became the object of the state's control until it culminated in the National Socialism of Adolf Hitler.

This virus spread beyond the borders of Germany. For 25 years and more the germs of economic collectivism or Socialism have been fermenting throughout the whole world. Governments have exerted pressures, in varying degrees, to fetter the free functioning of markets and to restrict the activities and opportunities of men.

Russia, Germany and Italy succumbed to absolute statism or totalitarianism in which individual freedom for all practical purposes was extinguished. In England much of the collectivist philosophy of pre-Nazi Germany has become imbedded. In other European countries, in the Far East, in Latin America, the trend has been toward state corporations, cartels, both private and governmental, monetary manipulation, subsidies, unduly high tariffs, import quotas, bartering and governments trading with other governments.

Our United States, too, has been afflicted with this bureaucratic power over the economic activities of people, with its lessening of competition and constant restriction of individual freedom. Excursions into collectivism in recent years have been frequent. While we have traveled a long way down the road toward the compulsory state, there is still time to return to the faith of our Founding Fathers.

For 150 years our country was a land of opportunity for all persons to achieve the rewards of their initiative, ingenuity, skill and industry. We had a system which created and multiplied wealth through encouraging men to exercise their initiative. Here, as a result, for the first and only time in history, an overwhelming majority of a great mass of people enjoyed decent standards of living. Only during the last two decades has our economy been weakened by the introduction of collectivist philosophy.

Now we are told that the economy which produced this standard of living for the American people must be abandoned—that we must embrace economic collectivism. This, it is said, we must do in order that we may live in harmony and prosperity with nations that have chosen the collectivist course.

Interlocking Threads

Such is the primary justification offered for the multitude of proposals now being projected under the auspices of the United Nations Organization. These are the threads now being woven into the fabric that may become a strait jacket of government control for our American domestic economy as well as world trade. Each of these United Nations proposals should be studied in its relation to the other, for under the master plan it is intended that they should be coordinated under the U. N. Economic and Social Council.

Thus we find in the current proposals before the Food and Agriculture Organization of the United Nations declarations calling for international control of the production and marketing of basic foods and the "stabilization" of agricultural prices by fixing both maximum ceilings and minimum floors.

Presumably this is to be accomplished through a network of inter-governmental commodity cartels. Provision for such inter-governmental cartel agreements is made in a proposal by our State Department pending before another agency, the International Trade Organization of the United Nations.

The language of this latter proposal is so muddy and filled with so much double-talk, that it is difficult to say exactly what it does mean. In one place it calls on the member nations to forswear restrictive undertakings and to embrace competitive enterprise. But in

(Presented at the 26th annual meeting of the American Petroleum Institute, Hotel Stevens, Chicago, November 14, 1946.)

other places there are exceptions which virtually nullify all such high ideals.

At all events, the framework proposed for these inter-governmental cartel agreements is so broad that, in the words of Prof. Edward S. Mason of Harvard, who is partial to them, "countries adhering to a commodity agreement would have to commit themselves to a definite line of action on their domestic handling of the regulated commodities."

"Clearly," Professor Mason goes on to say, "the present domestic agricultural policy of the United States is quite incompatible with participation in the proposed type of commodity agreement."

Our farmers should take notice! So should we. The proposed framework for these inter-governmental commodity cartels might well cover any intergovernmental oil agreement having to do with the control of production, price or marketing allocations.

Of course, the Food and Agricultural Organization, the International Trade Organization and the International Bank for Reconstruction and Development will be tied into the operations of the International Labor Office, the World Health Organization, the International Refugee Organization, and the United Nations Educational, Scientific and Cultural Organization. All of these in turn will be tied into the Economic and Employment Commission and the Economic and Social Council.

Throughout all these proposals certain words appear and reappear: Stability! Orderly development! Cooperation! Collaboration! Mutually advantageous! Full employment! Integrated world economy!

How alluring are those words! But out of the bitter experience of the last few years we have learned that such words were the sheep's clothing under which the wolf of National Socialism hid.

We have learned that such specious phrases describe governmental controls that in Germany, Italy, Japan and Russia crushed the freedom of individuals. They mask an economic collectivism that would destroy our American competitive enterprise system and subsequently the freedom of our people.

Much of our government's approach to the world's postwar economic problems is away from the tried and true American system and towards compromising with, if not embracing, restrictive collectivism. Too many men in our federal government are without faith in the ability of competitive enterprise to serve adequately the needs of our people.

These men believe that government must guide and direct our activities. They believe that in order for the country to be prosperous, the government must tell the people what they can produce, where they can produce it, and at what price they can sell it. Professing to be friends of the people, they mistrust the people and look with contempt on the ability of the average man to take care of himself.

Yet they possess no intelligence or vision superior to that of the people themselves. Look back a little more than a year ago when these men were forecasting a depression with 8 million to 10 million unemployed in the first postwar year. Events proved them wrong. Nevertheless, much of the economic agony which we have suffered during the last year resulted from steps taken on the basis of these false forecasts.

With equally erroneous reasoning, many of these men for the last 14 years have been seeking to force a system of collectivism upon us, but with only partial success. Now they see the opportunity of establishing such a system in this country through the rear door of international treaties and agreements designed to weld us to the collectivism of the remainder of the world.

In this way, they apparently hope to achieve in a constitutional manner what otherwise would be unconstitutional. The Constitution makes treaties the supreme law of the land, on a par with the Constitution itself, overriding other federal laws, and nullifying state constitutions and laws which may be in conflict with the treaty.

This is the paramount danger that threatens us, for pursuant to the treaty making power, the federal government can exercise over our lives and activities authority and controls which otherwise would be impossible.

Perhaps we have escaped that danger. Certainly the recent election constitutes clear notice from the American people that they want no more economic collectivism. It remains to be seen whether that mandate will be honored.

For this reason each of these United Nations proposals, and all treaties and international agreements, should be scrutinized in every detail to guard against the possibility that they may radically change the entire political and economic structure of this country.

Oil long has been of particular concern to these economic planners. They sought, in a fashion, to cartelize the American oil industry under the Blue Eagle of NRA. When the Supreme Court shot down that bird of ill-omen, it was clear, even to the planners, that their objective could be achieved only by indirection.

Suddenly, in the summer of 1944, they dropped the Anglo-American Petroleum Agreement upon an industry dedicating all its attention and energies to helping win the war. To its everlasting credit, the American petroleum industry forced the withdrawal of that monstrous arrangement.

Fight Continues

More recent events, however, indicate that instead of being over, the battle to subject our industry to a super-state cartel has just begun. Thus it is worthwhile to refresh our minds regarding the contents and implications of that first version of the Anglo-American Petroleum Agreement.

Ambiguous and vague though the language of that agreement was, it provided a framework for governmental restrictions on the production of petroleum and its products, the fixing of prices and the allocation of marketing quotas upon the recommendations of an International Petroleum Commission.

Inherent in the implications of that agreement was the assumption of an obligation by our federal government, when it concurred in such recommendations, to undertake to carry them out in the domestic field. Despite the fact that jurisdiction over natural resources is among the powers reserved to the states in the Tenth Amendment, our federal government would attain the authority, by having entered into this treaty, to assume virtually an absolute authority over the production and distribution of petroleum and its products in this country. This version of the agreement was in all respects a super-state cartel. Such cartelization would constitute national socialization of the petroleum industry here and abroad. For these reasons the industry to a man angrily opposed this proposed agreement and it was withdrawn from the Senate where it had been sent for ratification.

Meanwhile, you will recall, a committee of the Petroleum Industry War Council collaborated with representatives of the State Department and the Petroleum Administration for War in revising the original agreement to overcome our objections. Finally, a draft was agreed upon which had the effect of assuring equal opportunity for the nationals of the United States and Great Britain to develop oil resources in their respective jurisdictions and recognizing the validity of all lawfully acquired concession contracts.

Establishment of an International Petroleum Commission to study and report upon the problems, trends and activities of the international petroleum trade was provided. But it was clearly understood that the findings and recommendations of this commission were to be of a purely advisory nature and that no obligation rested on either government to act upon them. It was further agreed that the governments of all oil-producing and consuming nations would be invited to become parties to the agreement.

This revised draft was acceptable to the industry, by and large. Standing alone it could not be used as a vehicle for restrictive control of the industry. The British accepted this revised agreement in September of last year. The Senate has not yet acted on it.

There the matter stood until last August when State Department spokesmen in a radio broadcast made clear their thought that this agreement was not to be the final solution of the controversy but, in effect, was "only the first step toward the world-wide agreement we need."

John A. Loftus, chief of the Petroleum Division of the State Department, who thus characterized the agreement, went on to say that "the objectives of the Anglo-American Oil Agreement need to be implemented and strengthened on a world-wide basis."

I direct your attention to the phrase: *"need to be implemented"* which would seem to indicate Loftus felt that there was a need to *"put teeth"* into the agreement—the very opposite of an understanding for purely advisory action.

Substantiation for such an interpretation is to be found subsequently in the broadcast in suggestions that a broader understanding sponsored by the United Nations might be developed for the oil industry that would *not* be purely advisory.

Charles B. Rayner, State Department petroleum adviser, concurred in these suggestions. The moderator of the program, in summarizing the discussion, according to an official State Department press release, asserted:

> "To conclude, then, *we need more international control* over the development of the world's oil resources to guard against international friction. The Anglo-American Oil Agreement is a start—a good statement of principles, but *with no real authority.* These principles should be extended under the United Nations to as many other

■ CONTINUED ON PAGE 53

Recent Developments in

Pipe Line Technology

By H. H. ANDERSON, Shell Pipe Line Corporation, Houston

"RECENT" is what you make it, so we're going to review wartime as well as postwar advances in oil pipe lining. We need go prewar only to observe that producers, refiners, and marketers for 75 years have vied without stint to catch the public eye. Meanwhile pipe liners, like other subterranean life, were kept out of sight and mind.

Then came World War II with its headlines—"Pipe lines and railroads prevent field shutdown"; "Big Inch lines span half a continent to keep refineries going"; "Product lines supply vital war markets"; "Portable pipe lines make mechanized warfare practical"; "Pipe line across Channel serves invasion army"; "Indo-Burma pipe line relieves China"; etc. True, the public also heard of 100-octane, toluol, and butadiene—but in petroleum it turned out to be a pipe liners' war! That's a recent development I am proud to review! But we must fervently pray that the publicity will not boomerang and make pipe lines even worse political footballs than prewar.

In discussing domestic pipe line "developments," we shall avoid wishful thinking, and shall postpone further reference to WEP's Jumbo and his bride because Pearl Harbor found us with about 132,000 miles of Not-So-Big Inch lines on hand to fight the war. These were modified and pushed to remarkable new efficiencies. Perhaps some of the techniques then developed can be profitably applied today—in fact, most of us can benefit from hearing of another's experience. In the time allotted we can present little more than a layman's listing of the many noteworthy developments that have come to our attention.

Improving Older Lines

Increased line capacities: The sinking or transfer of tankers forced immediate steps to increase capacities of existing lines. With but little new pipe and few prime movers or pumps available, we taxed our ingenuity for methods to raise throughputs with equipment on hand.

Looping lines: An obvious first method was the old one of adding pipe loops to our trunk lines. Most of the pipe used was taken from abandoned lines or wells, or was purchased second- or third-hand from junk dealers. Some of the loops were added as reserve crossings at rivers, thereby increasing line capacity not only in the orthodox way, but also through adding insurance against prolonged interruptions during flood-time breaks.

Pipe-resistance reductions: The maintenance of pipe walls free of wax or other deposits received much attention. Our distinctive "go-devil" or scraper has been improved in many ways. Neoprene discs and wire brushes have replaced hard-rubber discs and knives. On the larger scrapers, life of discs has been increased by building them around a hollow air-tight cylinder for buoyancy and by drilling angular holes through them to cause rotation in transit. These holes also enable the oil slip streams to flush the debris ahead of the scraper.

Station capacity increases: Station capacities were increased in many ways. In centrifugal pumps the casings were bored out, and the impellers were built up and rebalanced to raise deliveries 5 to 10 percent. In reciprocating pumps the cylinders were fitted with oversize liners and plungers and—where possible—run at higher speeds. Motor-power outputs were stepped up far beyond normal ratings, and some engines were supercharged to develop the needed extra power.

Stream viscosity reductions: By injecting field gasoline plant products into crude streams, the stream viscosities were lowered, with resultant higher daily throughputs at normal station pressures. Adding greater amounts of light products during winter months minimized the seasonal throughput decreases. Some crude streams regularly carried as much as 12 percent of such "volatiles." Refiners benefited greatly because the light fractions were valuable in the manufacture of 100-octane gasoline.

Improved Customer Service

The war-accelerated quest for ways to better serve the customers has borne fruit in many ways.

"Closed" crude lines: The advantage of operating crude lines without station float tanks is more and more realized. True, such operation in some instances has reduced their capacities as compared with the hoary practice of "putting and taking" into and out of station tanks before and behind each more-viscous batch of oil, but reductions of evaporation and inter-batch contamination are attained as offsetting benefits. Batch interfaces can be readily followed through the lines by use of gravitometers or, in product lines, by visual color comparison. Crude-line slowdowns due to "closed" operation can be minimized by controlled blending or injection of "volatiles."

Field segregation and blending: As an aid to refineries overtaxed by war demands, improved segregation of various crudes and the controlled blending of others close to their origins not only simplified distillation processes, but also reduced the number of refinery tanks required to assemble the several required charging stocks. Usually the pipe line operator was able to render this aid with little or no increase in plant or cost.

Running direct to refinery topping units: As another outcome of controlled blending in the fields, it was found practical to run the crude streams from pipe line direct into the topping units. This practice also avoids evaporation losses of light or volatile-laden crudes from refinery stock tanks. Such line-to-still operation requires the pipe line operator to keep the delivered stream uniform in quality and reasonably free from water. The refiner must be continuously informed of possible changes in stream composition. This is determined by locating at the pipe line station immediately upstream such tell-tales as continuous vapor-pressure recorders, water detectors, automatic samplers and gravitometers.

Delivering products uncontaminated: Advances have been made in reducing contamination or intermixing of adjacent batches in products lines. Further attention to choice of valve locations and elimination of dead spots has been found imperative. Some operators use synthetic-rubber plugs, water slugs, or neutral buffer stock between batches, but the trend is to discard these in favor of direct contact and keeping the stream moving above the "critical" velocity and under full line pressure at all times. Excellent results are being obtained by this technique.

In line loops the problem of avoiding contamination due to varying flow rates in parallel sections has been solved by manipulation of a valve to equalize pressure differentials across orifices in the two sections.

Blending ethyl fluid into gasoline streams: Continuous blending of ethyl fluid into unleaded gasoline streams is another service performed by some products line operators. To do this, a complicated mechanism is required. However, as to its principle of operation, the weight on a beam scale is moved by a small motor clutched and released by differential pressure created by the flow of untreated gasoline through a venturi tube located in the pump-station suction line. The movement of the beam actuates valves to inject the ethyl fluid into the stream at the proper rate.

Other Improved Operating Techniques

The pipe line operator as well as his customers are better served by some of the practices just described. However, other techniques of most benefit to the operator also were developed.

Dispatching and communication advances: The dispatching of many pipe

The author, who is chairman of The API Topical Committee on Pipe Line Technology, was assisted in the preparation of this article by J. E. Mims, Shell Pipe Line Corporation, and by suggestions from members of the Topical Committee on Pipe Line Technology.

line systems has been simplified and expedited by the increased use of telephones and teletypewriters. Telegraph dispatching is becoming "horse-and buggy" stuff! Radio now provides two-way communication with personnel in isolated or scattered gathering systems, thus enabling closer contact of dispatchers with field men. Mobile or stationary FM (frequency-modulation radio) units and walkie-talkies now are common links used to speed up field operations.

During the war the extension of radio communication in private business was drastically curtailed; however, the Federal Communications Commission has since recognized pipe liners' rights to full use in this valuable tool. It has set aside appropriate bands in which wave lengths will be assigned to operators on proper application.

Carrier currents superimposed on telephone or telegraph circuits are used to perform the new techniques known as "telemetering" and "telegaging," i.e., the long-distance transmission of pressures and other meterable characteristics. These are adapted to keep dispatchers constantly informed of pressures and flow rates at distant terminals, booster stations, or pressure-control points. Line breaks or other failures thus show up immediately in the dispatchers' offices as unreconciled pressure changes or as discrepancies between line receipts and deliveries.

Fluids meter advances: "Closed" line operation with its beneficial movement of volatile liquids, reduction of storage tanks, and minimizing of evaporation losses, requires that streams be metered. Abrasive foreign material in most crude-oil streams limits the use of positive-displacement meters, although improvements are being developed to overcome this handicap. Inferential (throat or orifice) meters of various types thus are used extensively on crude lines for control data. Positive-displacement meters are gaining wide acceptance on products lines and in marketing terminals, but they have been at a disadvantage due to lack of an accepted code of practice. The new tentative "ASME-API Petroleum PD Meter Code," just now available for distribution, eliminates this deterrent. It culminates five years of work by a joint committee of oil-company engineers, meter manufacturers, and professional staff.

Automatic-station development: With labor costs at an all-time high and the possibility of a shorter work week in sight, further development of unattended automatic booster stations moves ahead. Necessary control equipment now is hard to get, but it has been proved in service, and on future installations should be even more reliable.

Mobile pumping units: Greater use is being made of mobile main line pumping units. Many older stations were stripped of standby units that were reset either on new lines or as boosters on enlarged lines. To provide some standby for station failure, portable main-line units were mounted on skids for emergency service when or where needed. This development, as well as the demonstrated reliability of regular equipment under high load factors, has taught operators that much expensive station standby equipment can be economically eliminated. Use of such portable units permits periodic overhaul of regular equipment, and fills the breach in emergencies. Permanent foundation slabs and manifold connections at each station enable unit transfers to be made with little time loss.

Tank-suction booster pumps: Many oil storage tanks worth a dollar per barrel of gross working capacity are reduced in efficiency by adverse topography, long suction lines, or high bubble point of the crude. Automatic electric-powered pumps, both centrifugal and axial-flow, now are available that can be installed to advantage in the suction lines at low cost and with little disturbance to the piping.

Engine fuel improvement: Use of run-of-stream crude oil as diesel-engine fuel in main-line stations is convenient. But many crudes make poor fuel due to their content of sulfur, suspended solids, carbon residue, asphalts, and gums which cause corrosion and abrasion of engine parts and dilution and contamination of lubricating oils. Entrained water often causes unsteady operation or stalling. Some operators are stopping such troubles by local "refining" of the crude to produce suitable fuel.

Gathering-system improvements: Gathering systems have suffered long from a general lack of planning and sound engineering. Most of them, like Topsy, just grew. In newer fields, however, they are getting preferred attention. Main arteries are being made larger, laid to trunk-line specifications, and graded for gravity flow. Lateral lines are being designed of welded steel for sweet crude service, of cement-asbestos or cement-lined pipe for sour crude, and all with facilities for scraping when necessary. There is a general trend toward standardization of lease-tank battery headers, and field pumping units. The use of time switches, interval timers, automatic tank shutoff valves, pressure flow regulators, and other controls on field pumping units serve to increase efficiency and reduce costs.

Better fire-fighting equipment: Most of us have some protection against fire, but recent development of water fogs and other improved fire-fighting methods and equipment indicate that we should make a careful check of present facilities for efficiency and economy.

The importance of preventive or corrective maintenance has been magnified many fold, because it has been almost impossible to obtain delivery of repair parts or new equipment.

Air patrol: Although the writer's oil company was the only one to use air patrol during the war (starting early in 1939 and flying with two planes about 16,000 miles regularly each month), postwar has witnessed wide acceptance of air patrols for detecting leaks, washouts, or line exposures along rights-of-way. Personnel transportation, mapping, construction, maintenance of telephone lines, and general inspections of line conditions also are simplified by use of airplanes. On weekly inspections of crude oil trunk lines, one air-patrol plane can perform the job of about 25 line walkers for one fourth of the cost (about 20 cents compared with 85 cents per mile). The patrols have proved equally effective in leak detection, with a decided advantage where they occur at river or creek crossings. Gathering-system patrols are not generally practicable because of their general layout and the presence of a maze of other lines.

On products lines the patrol has proved unsatisfactory for leak detection. Product leaks are difficult to observe from the air, besides which at large ones there is danger (caused by gasoline fumes in an explosive mixture with air) to planes flying above them at hedge-hopping altitudes. The airplane is useful on product lines, however, for periodic or special maintenance inspections.

Corrosion control: Corrosion continues to be one of industry's most serious problems. Many of the older trunk lines, badly deteriorated from soil corrosion, are being reconditioned and given new protective coatings supplemented with cathodic protection.

Gravity lines of steel pipe used for gathering in certain sour-crude fields on intermittent or low-velocity flow (less than 2½ feet per second) have a normal life expectancy as short as two years. Frequent scraping to remove accumulated brine and primary corrosion products has more than doubled their

---

THE year of 1941 witnessed the American pipe line industry serenely handling its business with 132,000 miles of lines in service. The enormous demands of World War II for additional domestic overland transportation of crude oil and products required not only the construction of new large lines, but also the operation of existing lines at remarkable new throughputs. Furthermore, the demands of the armed forces for at-the-front pipe line service were met with distinction.

H. H. Anderson

This paper recites briefly the many noteworthy developments in pipe-line technology that made these feats possible. Applicable to the older lines are discussed increased line capacities, improved customer service, other improved operating techniques, and improved maintenance methods. Discussed also are newer construction methods as well as trends in new line design.

The paper should provide operators with a useful list against which to check the state of development of their own systems and their fitness to meet competition of new large lines in the tight economic period ahead.

(Presented to Group Session on Transportation at the 26th annual meeting of The American Petroleum Institute, Stevens Hotel, Chicago, November 13, 1946.)

service life. Use of cement-asbestos pipe in such service is increasing, one such line being in fine shape after ten years of service. Cement-lined pipe should give more comparable service for higher pressures if the joints are properly sealed. Work is in progress to develop injected corrosion inhibitors for crude-oil lines, but the results cannot yet be appraised.

Products pipe lines have their own variety of internal corrosion. Data on very effective injected inhibitors have been widely publicized. Other measures, notably dehydration of product, have reached the stage of commercial use.

Internal corrosion of the upper parts of tanks by sour oil vapors is receiving vigorous attention. Most of the war-developed lacquer surface finishes available carry a volatile solvent that leaves defects in the film when it evaporates. Several coats of the lacquer are necessary for a perfect seal. The "experts" say that to be successful the film must be produced by oxidation, polymerization, or condensation.

As to coatings for buried structures, many refinements in application now give a better job than heretofore and assurance of almost complete protection for many years. In supplementary cathodic protection of trunk lines, the use of rectifiers is developing as the general practice. For protection of tank bottoms and shorter lines, sacrificial anodes of magnesium or zinc seem preferable; in fact, under favorable conditions they show a very low cost.

Line reconditioning: This has become one of the largest, if not the most important, maintenance jobs of the industry. Many vital lines were laid 20 or 30 years ago when corrosion was not understood. The higher wartime line pressures caused numerous leaks and ruptures that disclosed the damage done to pipe walls by corrosion. Corrective measures are being taken at a rapid rate by many operators. Among the improved techniques recently found for this work is a "reclaimer" which in one rapid and continuous operation strips the earth from the line and forces the pipe to the surface without damaging it.

After a line has been raised, any of several methods may be used in reconditioning. Where damage is extensive, the pipe can best be removed to a central location for repair. Coating and wrapping may be done there or after the pipe has been tied back into the line. "Over the trench" reconditioning (with the line kept in service) is cheaper and faster. When badly damaged sections are replaced, the line, of course, must be shut down long enough to permit cutting out the damaged section and splicing in the new pipe. The equipment used in reconditioning is, generally speaking, not new; but many recent advances have been made to speed up and improve the quality of the jobs.

Emergency-line repairs: To expedite emergency-line repairs, truck-mounted repair units, with all necessary tools or facilities, are being used to reduce labor costs as well as shutdown time and oil losses. Improved pipe tapping and plugging devices increase the efficiency of making cuts in both crude and product lines. Avoiding need for mud or asphalt plugs reduces contamination. These devices are of ancient origin but of more recent popularity.

Machinery maintenance: During the war, with little or no standby equipment in pumping stations, operating continuity records were established that reflect great credit to the maintenance personnel, and stand as an epic demonstration of their ingenuity. Much machinery and equipment downtime is caused by minor and easily correctible weaknesses. Consider, for instance, the conventional high-pressure plunger pump. Use of steel fluid ends stops the costly failures of cast iron. Light-weight alloy or micarta valves almost eliminate valve grinding and seat replacement. Packing and plunger replacements can be minimized by choice of plunger materials. Stainless steel (metalized on an iron base) or porcelain plungers wear ten times as long as the best iron ones and show none of the characteristic grooving. But it took a war to awaken some of us to such now-obvious improvements!

In line construction the development of new methods, or the complete acceptance of older ones, is apparent.

Aerial surveys: Use of aerial surveys to assist in the selection of pipe line routes is "old stuff" for those who could afford it, but it has since become a "poor boy's" method as well, because contact prints covering large sections of the United States now are available at nominal cost from the U. S. Agricultural Adjustment Administration in Washington.

Pressure welding: "Pressure" or solid-phase welding has been used a great deal on recently laid lines. Speaking generally as to costs, arc welding is cheaper for pipe sizes up to eight inches; costs are about the same for ten-inch pipe; and pressure welding is cheaper for larger sizes. The new technique is faster, and speed is a function of wall thickness rather than circumference. The joint strengths are as high or higher than the pipe wall if the welding is performed correctly.

Gamma-ray weld inspection: One organization reports the use of a gamma-ray inspection to insure good-quality field welds. It is done by wrapping a sensitized film in a light-tight container around the outside of the weld and inserting a radioactive element centrally in the pipe behind it. After a 15-minute exposure, they are removed and a plug is welded into the small hole through which the element was inserted. The location, nature, and extent of weld imperfections show up clearly on the negatives and can at once be corrected.

Hydraulic lineup clamps: The distortion of Big-Inch pipe in handling and stringing has led to the development of a clamp which forces the abutting walls into alignment, and thereby aids welding. Users claim a decided increase in speed of laying the larger lines.

I referred before to the WEP lines as Jumbo and his bride, neglecting to complete the metaphor by remarking that they are now our prize "white elephants." But, technically speaking, they are remarkable forerunners of a new era in pipelining. Designers of new lines are including many of the beneficial improved operating techniques already described, as well as newer equipment just now reaching the market in commercial quantities. In addition, they are benefiting by the Big Inch experience.

Larger pipe diameters: Experience has proved that it is more economical to obtain high throughputs by use of larger pipe than by increasing the number of stations or the line pressure: This is due partly to higher index costs of labor and machinery compared to costs of steel pipe. Even with the viscous crude oils of California, some operators are concluding that use of larger lines run at atmospheric temperatures are more economical than smaller ones in which the oil must be heated at each station. Thus, new and proposed lines of larger diameter are being designed with an eye to the future as well as the present. New lines probably will start operation at medium pressures or with extraordinary wide station spacing that will permit economical increases in pressure or number of stations to meet future needs. Increases in allowable fiber stress of steel line pipe through use of high-grade alloys and cold working has made this possible.

Thinner pipe walls and telescoping weights: Improvements in pipe coatings and cathodic protection as a guard against soil corrosion, as well as higher strengths of the steel used, are permitting the use of thinner pipe walls. Nor do we need to use one wall thickness through a line because, by varying the wall thickness in proportion to the hydrostatic head, we can save on the steel cost and yet keep a reasonable factor of safety.

Larger pump sizes: The increase in line size has required correspondingly greater pump capacities. The centrifugal pump has steadily gained popularity, even though it remains somewhat less efficient in energy consumption than the plunger pump. This popularity is due in part to low first cost and the special suitability of centrifugals for "closed" line operation. The old practice of connecting centrifugal pumps in parallel is now obsolete.

Improved pump design: Higher-speed triplex and quintuplex pumps are in use by at least one operator. Prime advantages are compactness and reduction of line surges. New vertical variable-stroke pumps are proving popular. By automatic or manual control, the plunger stroke of these can be varied from zero to a maximum while the pump is in operation. Their design, in effect, combines the flexible-volume characteristics of a centrifugal pump with the high mechanical efficiency of the plunger type.

Engine design trends: Due to its flexibility and greater economy, diesel power still holds the advantage over electric power. Engine-design trends now, as in the past, are toward decreased weight-horsepower ratios and lower first cost. Increased reliability, compactness, operating economy, and ease of maintenance are prime objectives of the designers. The use of superchargers is increasing, and "dual-fuel" engines that run on various ratios of gas and oil are available. Closed cooling systems, usually shell-and-tube heat exchangers, are replacing the less economical open types.

Improved general-station design: Piping manifolds are being placed aboveground to stop corrosion and make for accessibility. Station floors are being placed several feet above ground level to clear the manifold piping which is brought in through the floors to the pumps or instruments. Station buildings are being designed to perform their functions better. Noteworthy features are more convenient location of panels, engines, pumps, and auxiliary equipment; better ventilation and heating systems; noise-reduction treatments and provisions for greater personnel safety. Even better lighting and proper contrast of colors for eyestrain reduction are not overlooked.

River crossings: For river crossings,

more operators are using suspension bridges. For submerged lines the time-honored river "clamps" or weights are being abandoned in favor of welded sleeves to reinforce the pipe joints. Opinion varies as to whether buried river-crossing pipe should be coated, but the use of cathodic protection is general.

Speeded-up scraper handling: Greater use of scrapers in large lines has brought innovations in scraper spool and trap design. Injection is aided by use of slightly larger-diameter spools. Traps, built long enough to hold several scrapers, avoid the need to remove each separately. Traps made in diameter several inches larger than the line, and with small pipes tack-welded internally to center the scraper, reduce sticking and aid removal. For convenience, good housekeeping, and safety, the traps and input spools are being placed above-ground.

Electrical equipment: Electrical gear in pump stations has been steadily improved, and explosion-proof equipment is being installed almost entirely. The war forced the design of motors with less metal, but with no sacrifice in strength. Unitized transformer sub-stations now allow for better circuit arrangement. Forced-draft cooling of these has enabled them to carry greater loads.

As a means of avoiding shutdowns of electric-driven pumps due to circuit-breaker kickouts caused by power-line surges during storms, a manufacturer and an operator have cooperated to develop a quick-acting relay that will reset the breaker within 20 cycles (1/3-second) of the kickout and before the motor slows down too much. This device should prove a blessing on "closed" lines, because at present the shutdown of one station often over- or under-pressures the relays at the other stations—causing them to shut down also.

Tank farm design: Large tanks are being constructed of greater heights and smaller diameters to reduce the effects of inactive height and increase their volumetric efficiency. This design requires thicker shell sheets and heavier foundations to carry the increased pressures. Better devices for ground-level and remote gaging reduces earlier objections of gagers to high tanks.

The urge to conserve volatiles has developed methods of interconnecting fixed-roof and floating-roof tanks or vapor spheres. On most pipe lines, however, the floating-roof types of tank are proving to be the most flexible and efficient.

Conclusion

As was said previously, this paper is little more than a list of the noteworthy recent developments of our industry. We are offering it as a useful check list for all operators. The oil trade journals have been rich in fine articles describing fully most of these advances—readily available for the practical guidance of anyone who seeks to apply them to his own system.

Many of us can do little more than dream of building completely new systems. The mileage of new lines now proposed is insignificant compared to the mileage of lines that must remain in service. But, faced with the economic competition of some new larger lines, and placed between the rock of the Consent Decree and the hard place of further increases in labor and material costs, we shall be well advised to use all applicable improved techniques and get our houses in good order for the squeeze.

Looking Forward In Oil

■ CONTINUED FROM PAGE 47

governments as are willing to accept them. And *they should be implemented* in such a way as to assure the *orderly production and distribution* of the world's oil in the future."

To that statement by the moderator Rayner responded: "That's right," and went on to say that the sooner a world-wide oil organization is set up the better.

As far as I am concerned we are back where we were when the original Anglo-American Oil Agreement was before the Senate two years ago. If our government does not mean the pending version of the treaty to encompass all its intentions in the field of international oil, then I, for one, am opposed to it, and I will help do all we can to bring about its defeat.

Prior to the Loftus-Rayner broadcast, I was willing to go along with the revised agreement. I believed the oil men who had participated in its drafting had adequately safeguarded our domestic industry against restrictive actions. I further believed it was desirable to have some assurances that valid concession contracts and equal opportunity in exploration and developments abroad would be respected.

Danger to Industry

But if this agreement is to be the camel's nose under the tent of a restrictive inter-governmental cartel, then it becomes a real danger to our industry and an unrelenting fight should be made upon it.

We have more than the Loftus-Rayner broadcast to warn us to be on the alert:

Refer to the charter suggested by our State Department for the proposed International Trade Organization of the United Nations wherein recognition is given to inter-governmental commodity cartels relating to "exhaustible natural resources."

Read all the provisions in that document, but particularly the chapter entitled: Inter-governmental Commodity Arrangements.

Take note also of the recent call for the convening of a United Nations Scientific Conference on Resource Conservation and Utilization to meet in the last six months of next year to survey the extent of exhaustible natural resources throughout the world.

Consider these developments, with the Loftus-Rayner broadcast in the background, and ask yourself whether you can visualize in your mind, precisely and certainly, what is in store for the oil industry. It cannot be done. And, until we know exactly and certainly what is contemplated, we should withhold our support from any international undertaking affecting oil.

In fairness, it should be noted that two weeks ago Rayner appeared before the Independent Petroleum Association of America, at its Fort Worth meeting, to disavow any intent to extend governmental control over the oil industry beyond the boundaries of the pending Anglo-American Oil Agreement. He asserted that "this government has never contemplated giving more than advisory functions to any international body in the petroleum field."

Passing over Rayner's competency to speak for the government, let me say, either he suffered a severe lapse of memory on that occasion as to what has transpired in this field in the last 30 months—or he deliberately undertook to deceive his audience. His statements there cannot be reconciled with the facts—nor with his own words in the broadcast last August, as released by the State Department.

Strong Opposition

Judging by the adverse action taken on the Anglo-American Oil Agreement by the Independent Petroleum Association after Rayner's departure, he did not fool very many. As a matter of fact there is a large and growing segment of our industry who now oppose Senate indorsement of this treaty.

No demonstration has ever been made of the necessity for any special treatment of oil in international affairs. The plea that "we are running out of oil" has become shelf-worn with time and has been riddled to shreds by the course of events.

As pointed out earlier, we have today—despite the demands of the war years—the largest proved reserves in history. We also stand today on the threshold of technological developments which promise to multiply our resources and their utilization more than twofold in the immediate years ahead.

This is the answer to the requirements of the military services for national defense. Means to satisfy those requirements do not lay across the seas; neither do they lay in any governmental cartels. They lay here at home, not alone in the earth of America, but in the scientific research laboratories and, above all, in the spirit and initiative of the American men of oil. Thus were the needs of national defense satisfied in two great wars and thus will they be satisfied should we again become embroiled in war.

Our industry stands ready today as it did in war to cooperate to the utmost with those in the Army and Navy charged with preparing our national defense. We ask only that they have faith in the ability of free men to produce what may be needed again just as free men produced all that was needed in the conflict just ended.

In the field of foreign oil our government has no reason to go beyond insisting upon non-discriminatory commercial treatment of all American oil marketers; upon the "open door" principle of equal opportunity in exploration and development rights; and, upon just and adequate compensation for seizure of property by foreign governments. But our government should do exactly these things in respect to all Americans and commodities of trade through general treaties of amity and commerce.

American oil asks no special privileges, at home or abroad. Neither do we want to be subjected to super-state cartels and other restrictive controls.

We ask only the opportunity, both at home and abroad, to do business in the traditional American manner of competing with all comers, with none barred, on a basis of equal rights, without coercion or monopolistic restraints of trade.

If we are permitted to proceed along that highway of spirited competitive enterprise, then all the bright hopes for our industry will be fulfilled and we shall multiply many times our past contributions to raising the standard of living and assuring the national defense of the American people.

PRODUCTION HINTS

Classified Deck Speeds Sorting of Reclaimed Steel

MATERIAL RECLAIMING

Sorting and classifying salvageable steel materials are being speeded by one company through the use of an irregularly shaped steel deck set on low stilts adjacent to the scrap bin. Ten to 12 feet wide at the base end, or that end nearest the scrap bin, the platform extends out about 16 feet while narrowing down to a minimum width of only four feet. Scrap material brought in by the field trucks is sorted over by the salvage department men who pick out all reclaimable cold rolled steel, rod material, bar stock and any steel material that can be straighteend or smoothed out. Pieces having holes or slots cut out of them also are saved, since they are usable as braces, gussets or supports for other equipment. Twisted sections of derrick members, casing clamps, tie-bolts, or previously fabricated equipment now being junked, are stripped of rusted bolts, rivets or small gingerbread material, then cleaned, straightened and laid out in neat piles on the section of the deck which corresponds to the lengths of the salvaged material.

Unusable steel material remaining in the bin is sold as scrap, while the neat, classified piles of salvaged pieces are removed to the machine shop where they are used in the construction and repairing of new or existing equipment.

Tool Boxes Serve Multiple Purpose

TOOL CARE

A weather- and wearproof tool box is necessary on the lease truck to protect repair and maintenance units against accidental injury through shifting of heavy equipment on the truck bed. One company equips the service truck with paired steel boxes, fabricated from tank steel plate, and mounted just behind the cab at each side of the bed. Space is left between the boxes for manipulation of the winch line, while the extension of the boxes themselves protects the winch and its line from damage. Pipe railings, welded to the outer edge of the boxes and extending about eight inches above them, are carried forward to junction with the guard behind the cab. These rails serve as backs and afford grips for the members of the gang who use the tool boxes as seats while riding to the job.

The boxes have side doors opening outward from the truck so that tools are always handy, even though there may be a capacity load piled across the tops of the enclosures. The doors are hinged at the bottom, and are equipped with limit chains so that they may be swung down and serve as shelf for the tools until it is desired again to close the unit.

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See Composite Catalog Page 1907

Perhaps this can
HELP SPEED
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PRODUCT
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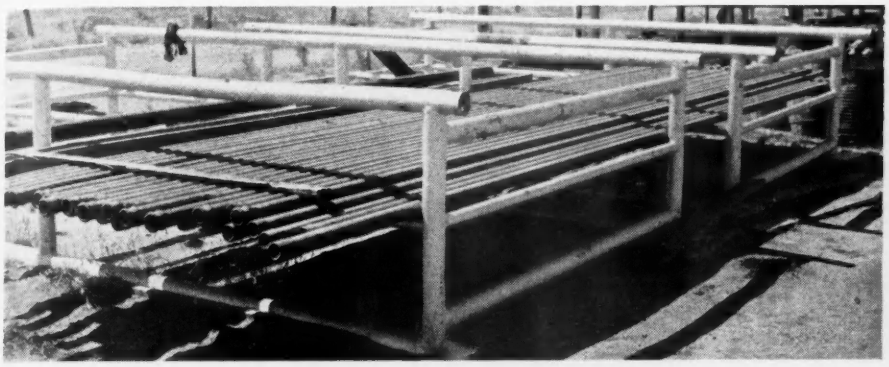
program

SEE PAGE 2

Double Decked Pipe Rack Saves Yard Space



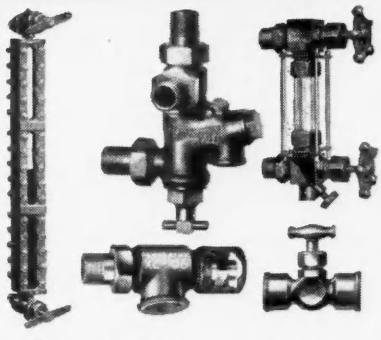
PIPE STORAGE

Limiting the area over which equipment is stored in any oil field warehouse storage can be facilitated by the application of the illustrated pipe storage rack. By virtue of its construction, this single pipe rack actually does the work of two racks, and yet occupies the space required by one. This application is saving valuable space in the storage yard of one drilling company.

A majority of the racks are made of salvaged drill pipe material, but differing from the common type, this rack has an intermediate level on which can be racked the smaller sizes of tubular goods. This middle rack does not interfere in any way with the loading and unloading operations from the upper level. Such materials as tubing, the smallest sizes of drill pipe, and miscellaneous tubular goods less frequently used are stored in the lower section. While it may require more time to load and unload equipment from this middle level, it is well worth the effort in space saving.

The rack shown was built in two separate skid-mounted sections to permit their being hauled more easily to the field for use beside a drilling rig.

PENBERTHY
QUALITY
PRODUCTS



Penberthy liquid level gages of various types—injectors—ejectors—all so widely used throughout the oil industry because they have always been dependable under the most severe service conditions.

All are of rugged construction and made by an organization with 57 years experience in the manufacture of quality products.

See Pages 2450 to 2455, Composite Catalog

PENBERTHY INJECTOR CO.
DETROIT, MICH. Canadian Plant WINDSOR, ONTARIO

Automatic Water Bleeder

TESTING TANKS

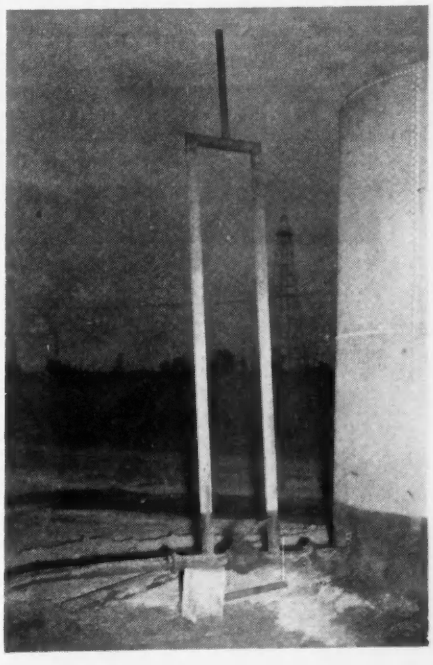
Practically every tank battery must be equipped with a test tank to make it possible to run periodic production tests on each well. This is usually done by switching the well to be tested into a test tank and measuring the amount of water and oil produced in a 24-hour period.

When a test of several days' duration is necessary, such as is required after a workover job, means must be provided for getting rid of the salt water without constant surveillance of the pumper. One company solved this problem by installing the "jack-knife" shown. The inverted U-bend with the two-inch connection at the top and a union on each end with a block valve between the legs was prefabricated in the company welding shop. When it was found necessary to equip this tank with an automatic water bleeder, the regular stop connection was removed and this one installed by means of the unions. The oil outlet was connected to a separate stock tank, so that the test could be continued indefinitely. With this arrangement, a well can be on test continuously, each well taking its turn, giving much better records for the engineering department than if tests are made for only 24 hours' duration.

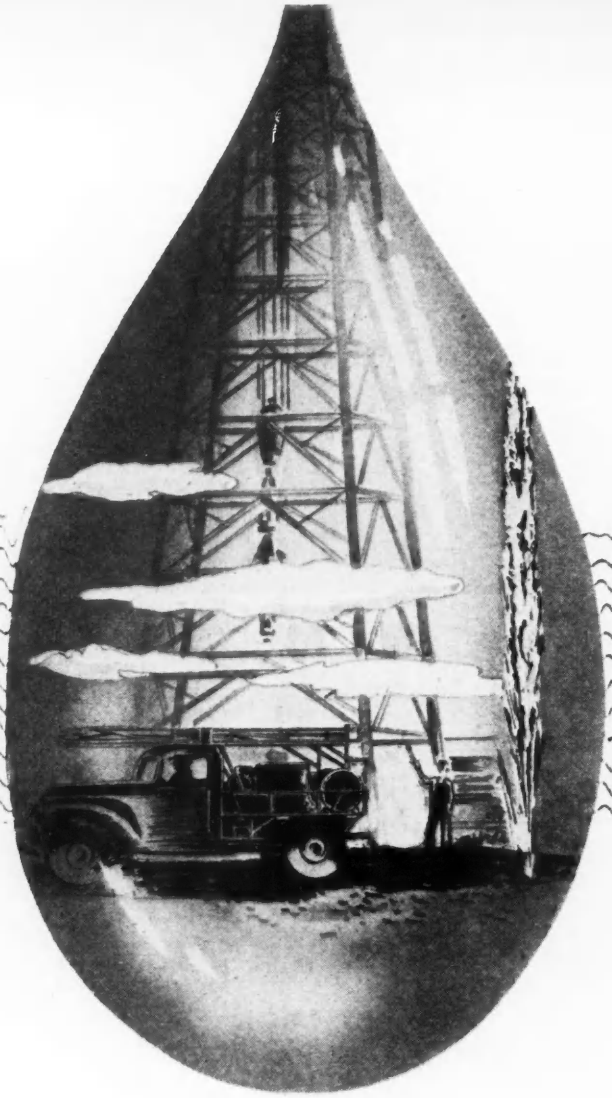
Valve Stem Extension

LEASE OPERATION

Lease lines as well as producing wells, frequently are located in low river bottoms and areas where flood waters cover all lines and equipment during certain seasons. Where high water levels do not extend too far above ground level a practical solution to the problem of controlling lease production and tank shipments during flood conditions is illustrated. A piece of pipe may be tack-welded or attached to the gate valve stem with set screws and the wheel of the gate fastened to the top of the extension stem. This height will be determined by high water levels. To prevent damage to the valve stem extension, a substantial guard can be constructed around the stem by four uprights of two-inch salvaged pipe. The top of the guard is braced as shown by two-inch cross members and welded. The lower ends of the guard are placed in concrete to form a solid and durable guard during high water to prevent drift wood or other



Building Foundations for the OIL INDUSTRY SKYLINE . . .



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• Accurate data . . . thoroughly compiled and correctly interpreted . . . by General has been the foundation for many towering oil industry skyscrapers. Operators have successfully relied on General to lead the way to their next discovery well . . . to approve or condemn acreage.

For more than a decade, dependable General crews have been accurately determining and locating conditions favorable to finding new oil. Accuracy has been characteristic of all General operations.

Today, General is better equipped than ever to serve. Crews are available for domestic and foreign work. Let them help build a dependable foundation for your next exploration program.

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October Wildcatting Sets High for Year

THERE were 480 exploratory tests drilled in the United States during October to make it the most active exploration month of 1946, and to bring the year's 10-month total to 3936 tests, a gain of 7.4 percent over last year's comparable period.

Although wildcatting and semi-wildcatting was carried on on a larger scale in October than in the previous month, the net results, producers to dry holes ratio, were not as encouraging. Of the 480 tests drilled, October netted 82 producers, while 429 holes in September yielded production from 92 wells. Comparing the two months mathematically, October's efforts were 17.1 percent successful against 21.4 percent for the preceding month.

Exploration drilling for the first ten months of this year has resulted in 3936 wells being completed, compared with 3665 in the same period of last year. So far in the current year 771 wells have

Summary of Results of Exploratory Drilling

ITEM	Oct., 1946	Sept., 1946	Ten Months JAN.-OCT. 1946	1945	Percent Diff.
Oil Discoveries	59	42	432	385	+ 12.2
New Fields	36	29	261	263	— 0.8
New Pays	23	13	171	122	+ 40.2
Distillate Discoveries	3	11	58	38	+ 52.6
New Fields	1	4	26	26	.....
New Pays	2	7	32	12	+166.7
Gas Discoveries	6	11	99	90	+ 10.0
New Fields	6	7	76	79	— 3.8
New Pays	.....	4	23	11	+109.1
Total Discoveries	68	64	589	513	+ 14.7
Extensions to Fields	14	28	182	155	+ 17.4
Oil Fields	10	16	131	133	— 1.5
Distillate Fields	.....	.....	4	6	— 33.3
Gas Fields	4	12	47	16	+193.8
Total Prod. Tests	82	92	771	668	+ 15.4
Dry Holes	398	337	3,165	2,997	+ 5.5
Wildcats	385	328	3,082	2,927	+ 5.3
New Pays	4	2	33	38	— 13.2
Outposts	9	7	50	32	+ 56.3
Total Expl'tory Tests	480	429	3,936	3,665	+ 7.4
Percent Productive:	17.1	21.4	19.6	18.2	.....
Percent Dry:	82.9	78.6	80.4	81.8	.....

Results of Exploratory Drilling in October and First 10 Months, 1946-1945, by Districts

State or District	MONTH OF OCTOBER, 1946													FIRST TEN MONTHS, 1946																	
	Productive Tests									Unproductive Tests			Total Exploratory Tests	Productive Tests									Unproductive Tests					Total Exploratory Tests	
	New Fields			New Pays			Extensions			Total Productive	Wildcats	New Pays	Outposts		New Fields			New Pays			Extensions			Total Productive		Wildcats	New Pays	Outposts	Total Dry			
	Oil	Gas	Dis.	Oil	Gas	Dis.	Oil	Gas	Dis.						Oil	Gas	Dis.	Oil	Gas	Dis.	Oil	Gas	Dis.	10 Mo. 1946	10 Mo. 1945				10 Mo. 1946	10 Mo. 1945	10 Mo. 1946	10 Mo. 1945
Alabama											1			1											1	11			11	18	11	19
Arizona											1			1												2			2		2	
Arkansas	1								1	4			5	4			2			1			7	1	41		1	42	34	49	35
California	2	1						1		4	29		33	10	4		4			6	4		28	12	207			207	245	235	257
Colorado											1		1				1			4			5	5	10	2	1	13	8	18	13
Florida																				1			1		19			19	11	20	11
Georgia																									2			2	6	2	6
Illinois	9			5			4			18	57		75	25			26			42			93	88	439			439	321	532	409
Indiana	1									1	8		9	6	1		3			5			15	8	66			66	83	81	91
Iowa																													1		1
Kansas	3			1				2		6	26		32	34	6		6			18	13		77	81	217			217	273	294	354
Kentucky	2									2	4		6	6	2		4			5			17	12	71			71	80	88	92
Louisiana	1			4		1				6	19		26	16	5	5	29	3	12	1	2		73	51	176	1	3	180	113	253	164
North Louisiana											11		12	6	4	2		1	2	1	1		17	17	102	1	2	105	67	122	84
South Louisiana	1			4		1				6	8		14	10	1	3	29	2	10		1		56	34	74		1	75	46	131	80
Michigan	1	1								2	22	1	25	11	4	1		3		5	1		25	23	192	1	2	195	205	220	228
Mississippi											8		8	1	1				1		1		4	9	57			57	105	61	114
Missouri											2		2												16			16	20	16	20
Montana	1	1								2	2		5	1	1		2						4	8	16		3	19	16	23	24
Nebraska																									3			3	3	3	3
New Mexico											4		4				2			2	1		5	10	42	2		44	59	49	69
New York																									1			1		1	
North Carolina																									4			4	1	4	1
Ohio								1		1	3		4	1	8					1	14		24	24	36			36	54	60	78
Oklahoma	5	2					2			9	76		85	51	16	1	5	5		14	3	1	96	93	297			297	259	393	353
Oregon																									2			2		2	
Pennsylvania															3								3		4			4		7	
South Dakota																									1			1	1	1	1
Tennessee																									2			2	2	2	2
Texas	10	1	1	13		1	3			29	115	2	7	153	92	20	18	85	11	19	23	7	3	278	227	1118	26	39	1183	1055	1461	1282
E. Texas Border											4		4	3	3	1	1				1		9	8	11			11	17	20	25
Rest of E. Texas	1									1	4		5	5		2	3			1	1		12	10	71	2		73	62	85	72
North Texas	2			3						5	33		38	27	2		15	1		2			47	45	311	4	2	317	256	364	301
West Central	4			2						6	14	2	22	22	3		11						36	21	153	6	2	161	107	197	128
West Texas	3			1			1			5	7		17	15	4		14			11			44	42	119	8	18	145	190	189	232
Panhandle																									11	1		12	9	12	9
Upper Coast			1	2						3	17		20	7		4	23	4	11	5	2	2	58	51	115	1	3	119	123	177	174
Lower Coast		1		5		1	1			8	17		26	3	3	10	15	2	8	1	3	1	46	39	129	2	8	139	145	185	184
Southwest Texas							1			1	12		14	4	5	1	3	3		3			19	8	115	1	4	120	101	139	109
South Central											7		7	6				1					7	3	83	1	2	86	45	93	48
Utah											1		1	1									1		4			4		5	
Virginia																									2			2		2	
Washington																									1			1	1	1	1
West Virginia											1		1		4								4		8			8		12	
Wyoming							1			1	1	1	3	2	1	1	2	1		3	1		11	15	14	1	1	16	23	27	38
Total U.S.	36	6	1	23		2	10	4		82	385	4	9	480	261	76	26	171	23	32	131	47	4	771	668	3082	33	50	3165	2997	3936	3665

proven productive for a score of 19.6 percent against last year's 18.2 percent registered by 668 producers. In other words, 271 more wildcats and semi-wildcats drilled this year than last resulted in 103 more wells proving additional reserves of crude oil, distillate or gas.

New High Probable

This year's exploration program, which has been retarded by shortages of materials and equipment, is now within 400 tests of equaling last year's total mark, the all-time peak. As the average month's completions are about 400, and with two more months to go in this year, it is quite evident that 1946 will set a new high in exploration activity.

This year's drilling has netted 432 new sources of oil against 385 in last year's ten-month period. These included 261 new fields against 263, and 171 new pay horizons in established fields against 122. Wells that extended production in existing oil fields totaled 131 this year against 133 last year.

Distillate discoveries numbered 58 this year against last year's 39. These included 26 new fields in each period, and 32 new pay levels compared with twelve. Distillate field production was extended at least one-half mile by four wells this year against six.

New gas pools in 1946 numbered 99 compared with 90 in last year's ten months. These new gas discoveries were 76 in wildcat territory against 79 last year, and 23 new horizons to eleven. The boundaries of 47 gas fields have been expanded thus far in 1946 against last year's sixteen.

Dry Holes Compared

To date 3165 exploratory efforts have resulted in dry holes compared with 2997 same period last year. Of these 3082 were in wildcat area against 2927, and 33 were seeking new pays in proven territory, while 38 such tests were dusters in 1945. Fifty outposts, attempting to extend field production at least one-half mile, failed to show so far this year, while only 32 failed in the previous period.

The search for new reserves resulted in 1461 tests being drilled in Texas against 1282 in last year's ten months, while Oklahoma's total rose from 353 last year to 393. Louisiana was up to 253 from 164. Activity in California this year was down to 235 tests compared with 257 at the same time last year, and New Mexico's was down to 49 wells from last year's 69. This year's activity in the Rocky Mountain region remained about the same as the previous year's; the state's totals being Colorado 18 to 13, Montana 23 to 24, and Wyoming 27 to 38 last year.

This year has seen 532 tests drilled in Illinois against 409 in last year's comparable period, while Indiana's dropped to 81 from 91. Kansas also showed a decline to 294 wells from 354, and Michigan dropped to 220 from 228.

Five wildcats have been drilled in North Carolina so far this year, without success. Two more, one an off-shore operation, are preparing to move on to locations. Maryland has a wildcat now drilling, the first test in this state in a number of years.

New Oil, Distillate and Gas Fields and New Pay Horizons Discovered in the United States in October, 1946

Also Important Extensions to Established Fields

COUNTY	FIELD	COMPANY, WELL AND LOCATION	Date Spudded	Date Completed	Total Depth (Feet)	Completion Horizon (Feet)	[1]Name, Character and Age of Producing Formation	[2]Initial Production Method and Choke	Gravity of Oil	[3]Structure: [4]Method of Discovery	Tentative Evaluation of Discovery or Extension (Opinion of Relative Importance of Area from General Viewpoint of the Industry Based on Pertinent but Necessarily Incomplete Data: Later Development or More Complete Data Obviously Might Require Revision of this Tentative Opinion).
		ARKANSAS—New Oil Field									
Lafayette	Lewisville, W.	McAlester Fuel Co.'s Adam's Est. 1-A, sw nw 16-16s-24w, 3½ mi e Spirit Lake prod.	8-30-46	10- 8-46	4350	3977- 3992	Hill sd; L Cre	P 145; 55 sw	36.6	Flt	May be continuation of Spirit Lake fld on flt line play.
		CALIFORNIA—New Oil Fields									
Kern		Union Oil Co.'s DiGiorgio 71, 3-31s-29e, 1 mi se Mountain View fld		9- -46	4705	4505-	Santa Margarita sd; Mio	F 200	27		
Los Angeles		Basin Oil Co.'s Standard Brick 1, 28-2s-14w, Inglewood area, 1 mi nw of Potrero fld.		10- -46	10418		Miocene	F 250; 6 mln; ½"	28		
		CALIFORNIA—New Gas Field									
Kern		The Texas Co.'s West Pet. Co. 1, 29-30s-22e, alng the Belgian Anticline abt ¾ mi s of McKittrick fld.		10- -46	5173	5143- 5173	Oceanic sd	10 mln			Has characteristics of condensate pool.
		CALIFORNIA—Gas Field Extension									
Yolo	Winters	Shell Oil Co.'s Winters Unit 1-1, 19-8n-1e, 1 mi nw of McCune 1, disc. well		9-29-46	5238	4960- 4975 5030- 5034	Sd; Eocene	3.1 mln; ¼"			
		ILLINOIS—New Oil Fields									
Clay	Hoosier, N.	Eason Oil Co.'s N. E. Gibson 1, sw nw sw 35-5n-7e, 1 mi nw Hoosier pl.	8-23-46	10- 8-46	2823	2808- 2815	Aux Vases sd; Miss	P 30			
Clinton	Beaver Crk, S.	J. L. Garard's Vieregge-Mahlandt Comm. 1, sw ne nw 7-3n-2w, 1¾ mi s of Beaver Creek pl.	8-28-46	10-22-46	1146	1139- 1145	Bethel sd; Miss	F 17; 42 wtr; ½"			Produces fr same pay as Beaver Cr., but cut off by dry holes.
Gallatin	Junction, N.	J. Reznik et al's A. Valter 1, se se ne 3-9s-9e	7-25-46	10- 8-46	2749	2726-	Aux Vases sd; Miss	P 8; 24 wtr			Approx 3 mi ne of Junction pl., s of Inman, W pl and sw of Inman pl.
Jasper	Wakefield	J. W. Rudy's Dewhirst 1, se ne se 16-5n-9e	9-26-46	10-29-46	3184	3122- 3125	Rosiclare li; Miss	P 40; 52 wtr			3¼ mi w of Dundas Consol. pl and s of Bogota pl.
Wabash	Browns, E.	Magnolia's W. J. Pfeiffer 1, se ne nw 11-2s-14w, 2¼ mi se of Browns pl.	9-15-46	10- 1-46	3050	2596- 2601	Cypress sd; Miss	P 12; 34 wtr			Only one dry hole within a mile.
Wabash	Lancaster, S.	Sam Malis et al's W. L. Litherland 1, nw nw se 23-1n-13w, 2½ mi s of Lancaster pl.	8- 1-46	10- 1-46	2809	2720- 2732	McClosky li; Miss	P 160; 10 wtr			Dry offset on n and dry holes within ½ mi to the e and s.
Wabash	Maud, N.	Hayes & Wolfe's L. Smith 1, nw nw sw 17-1s-13w, abt 3 mi fr nearest prod.	9- 8-46	10- 8-46	2806	2696-	Bethel sd; Miss	P 26; 26 wtr			
White	Concord, N.	C. E. Brehm et al's J. R. Callicotte 1, se se nw 10-6s-10e	9- 5-46	10-15-46	2960	2950- 2960	Aux Vases sd; Miss	P 248			1½ mi n of Concord pl and 1¼ mi sw of Maunie, w pool.
White	Crossville	Inland Producers' Rister 1, se ne ne 15-4s-10e	9- 7-46	10-15-46	3164	3123- 3133	McClosky li; Miss	P 18; 10 wtr			Abt 2 mi nw fr prod in Phillipstown Consol. pl and sw fr Calvin, N. pl.
		ILLINOIS—New Oil Pays									
Richland	Olney, E.	Texas Co.'s R. Scherer 2, ne sw se 23-4n-10e	9- 1-46	10- 8-46	3062	3048- 3052 3053- 3062	Lwr O'Hara li; Miss Rosiclare li; Miss	P 16			All previous prod in pl fr McClosky li.
Wayne	Covington, E	Tex Harvey's Marshall Smith 1, se ne nw 21-1s-7e	8-28-46	10- 8-46	3260	3208-	Lwr O'Hara li; Miss	P 60; 10 wtr			2nd well in pl. Disc well prod from Aux Vases.
Wayne	Geff	Robinson & Puckett's Haymes 1, se nw ne 1-1s-7e	8-17-46	10- 1-46	3188	3140- 3145 3152- 3160	Lwr O'Hara li; Miss Rosiclare li; Miss	P 5			Dual comp. Probably most of oil comes fr Rosiclare which was producing in the pl.
White	Herald	Oil Management, Inc's J. J. Harrell 1, se sw nw 14-7s-9e	9-11-46	10- 8-46	2972	2962- 2972	Lwr O'Hara li; Miss	P 243			Edge well in pl prod almost entirely fr shallower pays.
White	Stokes-Brownsville	Winfrey Drlg. Co.'s Manley 2, sw nw ne 17-6s-9e	8-21-46	10- 8-46	2100	2085- 2100	Palestine sd; Miss	P 10; 12 wtr			Shallowest pay in pl. Nearly ½ mi e of nearest prod. well.
		ILLINOIS—Oil Field Extensions									
Clay	Clay City Consol.	Robinson & Puckett's Sam Bates 1, sw se sw 14-2n-8e, ½ mi ext.	9-13-46	10- 1-46	3035	3018-	Rosiclare li; Miss	F 1322			Extends pool in a rapidly growing area.

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New Oil, Distillate and Gas Fields and New Pay Horizons Discovered in the United States in October, 1946

Also Important Extensions to Established Fields

COUNTY	FIELD	COMPANY, WELL AND LOCATION	Date Spudded	Date Completed	Total Depth (Feet)	Completion Horizon (Feet)	[1]Name, Character and Age of Producing Formation	[2]Initial Production Method and Choke	Gravity of Oil	[3]Structure: [4]Method of Discovery	Tentative Evaluation of Discovery or Extension (Opinion of Relative Importance of Area from General Viewpoint of the Industry Based on Pertinent but Necessarily Incomplete Data: Later Development or More Complete Data Obviously Might Require Revision of this Tentative Opinion).
Clinton	Bartelso, W.	E. Goldschmidt's Loepker 1, nw nw ne 19-1n-3w, ½ mi ext	8-12-46	10- 1-46	963	938-	Cypress sd; Miss	P 10; 15 wtr			Second well in pool.
Wayne	Covington, E.	Ben Nation's Gallagher 1, ne sw nw 16-1s-7e, 1 mi n ext	9-12-46	10-15-46	3236	3219- 3236	McClosky li; Miss	P 10; 50 wtr			Slightly over 1 mi s of Geff, W. pl.
White	Maunie, N.	J. W. Thompson's E. Bruggen 1, (OWWO) ne nw sw 13-5s-10e, 1 mi n ext	8- 6-46	10- 1-46	3207	3150- 3180 3192- 3207	McClosky li; Miss	P 20			Comp 8-27-46 as dry hole. Rewkd to become producer.
		INDIANA—New Oil Field									
Posey	New Harmony, E.	Calvert and Willis' Wiley 1, sw sw ne 18-5s-13w		10- -46	2984	2974- 2984	McClosky li; Miss	P 226			
		KANSAS—New Oil Fields									
Ellis		Gulf Oil Corp's Zimmerman 1, sw sw nw¼ 22-15s-18w, 2 mi s of Ruder		10-22-46	3598	3581- 3598	Arbuckle li; Ord	F 714		Str trp; dr	Opens a small-area pool.
Rice		Phil-Han Oil Co.'s Chase 1, nw ne nw 28-18s-9w, 1½ mi w of Rickard pl		10-22-46	3255	3249- 3250	Arbuckle li; Ord	F 100; 100 wtr		Str trp; dr	Of little significance, due to high rate of wtr.
Rooks		H. H. & B. Drlg. Co. et al's Hilgers 1, ne ne ne 13-9s-19w, 1 mi se of Barry pl		10-13-46	3484	3479- 3484	Arbuckle li; Ord	F 2735		Ant; dr	Opens prod se of Barry pl; regarded as one of State's best strikes in recent years.
		KANSAS—New Oil Pay									
Rooks	Stockton	Coralena Oil Co.'s Hindman 1, nw nw ne 35-7s-17w		10-16-46	2713	2671- 2713	Topeka li; Penn	P 107		Ant; dr	Other prod in field fr Arbuckle li.
		KANSAS—Gas Field Extensions									
Stanton	Hugoton	Stanolind O. & G. Co.'s Baughman 1, "B", center of sect 9-30s-39w, 5 mi w ext		10- 2-46	2533	2320- 2362	Herrington sd; Perm	2.7 mln		Ant; dr	
Stanton	Hugoton	Stanolind O. & G. Co.'s Marble 1, center of sect 11-30s-39w, 3 mi w ext		10- 2-46	2590	2403- 2590	Permian sds; Perm	23.7 mln		Ant; dr	
		KENTUCKY—New Oil Fields									
Daviess	Stanley	Fox and Fox's Grant 1, 15-P-28		10- -46	1240	1225- 1240	Tar Springs sd; Miss	P 80		Ant; dr	
Henderson	Tunnel Hill	Carter Oil Co.'s Adams 1, 4-N-23		10- -46	2246	2226- 2246	Cypress sd; Penn	P 100			
		SOUTH LOUISIANA—New Oil Field									
Plaquemines	Alliance	Calif. Co.'s E. P. Brady Unit 4, 19-16s-24e, 3 mi se Bayou le Fleur disc well	6- 2-46	10-14-46	14187	9072- 9082	Miocene sd; Mio	F 60; 3.7 mln;	49.7	Seis	On Nov. 14, 1946, same Co.'s La. Citrus Lds. Inc. 1, disc oil flowing 207 bbls. of 38.7 gr.
		SOUTH LOUISIANA—New Oil Pays									
Acadia	Ritchie, N.	A. J. Bankhead et al's Chas. Dischler 1, 2440 n 0° 13 min. w th 2758.5 w fr sec 17-7s-1w, 3500 ft w ext.	9- 6-46	10-14-46	9104	9051- 9058	Sd; Oligocene	F 239; ⅛"	32	Dp Dome	Excellent new sand.
Jefferson	Lafitte	Texas Co.'s Geo. H. Kerner 6, 2438.3 n 1653.9 e swc 22-17s-24e	9- 4-46	10-17-46	10759	10391-10426	Sd; Miocene	F 243; ⅛"	36.5	Dp Dome	Important new deep sand.
St. Martin	Section 28	Gulf's Ruth Fleming et al 3-A, 1628.7 s alg el sect 28 fr nec, th 401.2 w at ra to se line in 28-9s-7e.	11-29-45	10-19-46	13123	10691-10742	Sd; Oligocene	F 491; 1/16"	33.1	Piercement Type SD	Excellent new sand.
Terrebonne	Lake Pelto	Texas Co.'s State-Lake Pelto lse 188-50, 7464 e of swc sect 17 in 16-23s-18e	7-24-46	10-28-46	12602	12393-12415	Sd; Miocene	F 82; 1.5 mln; 1/16"	47.4	Piercement Type SD	Deepest pay in field.
		SOUTH LOUISIANA—New Distillate Pay									
Terrebonne	Lapeyrouse	British-American's A. M. Dupont Corp. 1, 345.8 s 578.4 w of nec 15-20s-18e	6-17-46	10-25-46	13879	12640-12685	Sd; Miocene	F 162; 3.4 mln; 1/16"	52	Dp Dome	2nd well in field and 1st in 5 years.
		MICHIGAN—New Oil Field									
Allegan	Trowbridge, N	Spidel and Linsley's McCarn 1, nw nw ne 7-1n-13w, 2 mi n Trowbridge pl	9-11-46	10-16-46	1337	1335- 1337	Traverse li; Devo	P 15		Coral rf; geol	Small pool.
		MICHIGAN—New Gas Field									
Livingston	Howell	Panhandle Eastern Pipeline Co.'s McPherson 1, nw sw se 35-3n-4e, 30 mi se city of Lansing.	9-10-46	10-22-46	3907	3897- 3907	Salina dolo; Sil	7 mln		Ant; geol	Well on pronounced high, ½ mi fr old test that prod sml amount gas in Salina.
		MONTANA—New Oil Field									
Toole		Big West Oil Co.'s Proefrock 1, c nw nw 7-34n-4w, betw Cut Bank and Kevin-Sunburst flds.		9- -46	2364	2318- 2342	Ellis-Madison sd; Jur.-L. Miss	Sw 15			
		MONTANA—New Gas Field									
Liberty	Utopia, E.	The Texas Co.'s Nick Laas 2, nw ne sw 14-33n-4e		10- -46	4593	3559-	Jefferson dolo; Devo	20 mln			
		OHIO—Gas Field Extension									
Meigs	Stewart	Mathews Oil Co.'s Del White 1, sec 14 Chester twp. e of Hemlock Grove	7-20-46	9-14-46	1637	1633- 1636	Berea sd; Miss	0.27 mln			
		OKLAHOMA—New Oil Fields									
Cotton		L. H. Choate's Shelby 1, nw nw se 5-4s-10w, betw Temple and Cache Crk. pls		10-21-46	1359	1348- 1350	Pennsylvanian sd; Penn	F 65	37	Str trp; dr	Situated in ar now under intense development; altho not a big prod, it proves prod betwn the 2 pools.
Cotton		S. D. Johnston et al's Simon 1, ne se nw 9-3s-11w, 2½ mi sw of Walters		10-21-46	1615	1595- 1605	Pennsylvanian sd; Penn	F 35	35	Str trp; dr	Opens sml-ar pl sw of Walters townsite.
Noble		T. T. Eason et al's Carter 1, se ne se 19-22n-1w, betw Polo and Otoe City pls		10-10-46	5183	4808- 4811	Mississippi li; Miss	P 120	41	Ant; seis	Indicates fairly large structure.
Pittsburg		J. C. Craig's Wilkins 1-A, (OWWO) nw nw nw 8-2n-16e, 4 mi s of Ti		10-17-46	335	262- 291	Bartlesville sd; Penn	P 4	36.5	Ant; dr	Opens a sml shallow pl; only current oil prod in county.
Seminole		Manahan Oil Co.'s Harris 1, ne se sw 21-8n-7e, 1½ mi e of Wewoka		10-28-46	3303	3287- 3289	Gilcrease sd; Penn	F 94		Str trp; dr	Indicates small ar of production.
		OKLAHOMA—Oil Field Extensions									
Cleveland	Moore, W.	Kenwood & Schermerhorn's Hummel 1, sw sw se 28-10n-3w, ½ mi e ext		10- 4-46	8012	7880- 8012	Bartlesville sd; Penn	F 260		Ant; dr	First prod on land once used as Navy auxiliary flying field.
Oklahoma	Coon Creek	The Texas Co.'s Terrill 1, nw sw se 3-14n-1w, ½ mi se ext		7-29-46	5996	5975- 5996	Second Wilcox sd; Ord	F 850		Ant; seis-sub	Sd highly saturated; good recovery predicted.
		OKLAHOMA—New Gas Fields									
Lincoln		Olson Drlg. Co. et al's Masten 1, nw se sw 35-14n-4e, 1½ mi e of Cleveland		10-10-46	3022	2995- 3022	Cleveland sd; Penn	3.5 mln		Ant; dr	Of little importance.
Payne		Mulberry Oil Co.'s Nauman 1, ne sw se 2-17n-5e, 3 mi e of Cushing		10-10-46	3950	2963- 3000	Cromwell sd; Penn	1.9 mln		Ant; dr	Of little significance.
Navarro		**EAST TEXAS—New Oil Field**									
		Temple Hargrove et al's Guy E. Wallace 1, 500 ft fr sw and 330 ft fr se lines of 40-ac lse, or 900 ft fr M/E/NE and 330 ft fr se lines of John Jones sur.	6- 8-46	10- 5-46	6185	5447- 5454	Rodessa sdy-li; L Cre	F 39; 157 wtr; 1"	23	Flt; geol	Adjacent to Woodbine prod on Richland-Currie flt. Dp zone due to be narrow.
Cooke		**NORTH TEXAS—New Oil Fields**									
		Burk Royalty Co.'s C. N. Bentley 1, 330 ft out of nwc of 10.7-ac lse, or 1550 ft s & 930 ft e of sec of S. D. Brown sur. A-95, but in A. C. C. Bailey sur. A-44, 1¼ mi sw of Almon fld, but separated by failures.	8- 9-46	8-21-46	2233	2194- 2197	Strawn sdy-sh; Penn	P 27	40	Ant; geol	Sml lenticular sd ar; due to be erratic in performance.
Wichita		The Texas Co.'S Ed. Foster 2, 1025 ft n and 330 ft w of swc TE&L Co. 831 but in Stephen Dennison sur. A-64, 2400 ft nw of prod, but separated by failures.	8-31-46	10-31-46	3200	1885- 1895	Cisco sd; Penn	P 24	40	Ant; geol	Sml prod area; separated fr old prod by failures.
		NORTH TEXAS—New Oil Pays									
Archer	Manning-Nichols	Fred M. Manning, Inc's 1st Evangelical Church Unit 1, 1263 ft snl and 330 ft ewl of H&TC Ry. 19, blk 1, w by n offset to 4100-ft prod.	9-26-46	10-28-46	4410	4387- 4410	Strawn sdy-li; Penn	P 150	40	Ant; geol	*Intermediate pay for ar and dry in upr; lenticular sd and will be erratic in performance.*
Archer	Scotland	Shell Oil Co.'s W. M. Coleman 3-A, 990 ft snl and 330 ft wel lot 3, sec 74, ATNGI sur, RR sec									

Archer	Scotland	Shell Oil Co.'s W. M. Coleman 3-A, 990 ft snl and 330 ft wel lot 3, sec 74, ATNCL sur. PB after depleting 5100-ft Bend pay.	.....	9-21-46	5196	4542- 4584	Strawn sd; Penn	P 103; 2 wtr	40.7	Ant; geol	Prod fr "stray" sd in Strawn passed up for original comp in Bend. Not significant, as pay will be erratic in performance.
Young	.....	L. T. Burns et al's C. Ellis 2, 450 ft snl and 1400 ft ewl of s½ sec. 207, TE&L Co. sur.	9- 5-46	10-12-46	772	764- 772	Cisco sd; Penn	P 9	40	Ant; geol	Small and unimportant shallow area.
		WEST CENTRAL TEXAS—New Oil Fields									
Jones	.....	Delta Oil Co.'s W. H. Grove 1, 330 ft out nec subdiv 1, J. W. McKissick sur 204, 1⅓ mi s of Hawthorne pl and separated by failures.	8-15-46	10-13-46	2682	2680- 2682	Lwr Hope li; Penn	P 132	41	Ant; geol	Small prod ar; thickness of pay undetermined.
Jones	.....	R. H. Roark et al's E. T. Pitzer 1, 2640 ft e and 330 ft s of nwc Labor 25, but in nwc of Labor 19, Lge 150, Dewitt Co. School Lds, 2⅝ mi se of prod.	8- 4-46	10-13-46	5321	4539- 4550	Strawn sd; Penn	F 115; 3/16"	44	Ant; geol	Performance of this initial Strawn prod for county will stimulate dp explorations; extent of prod ar highly speculative.
Jones	.....	R. H. Roark-L. F. Hooker et al's F. C. Hodges 1, 467 ft snl and 1650 ft ewl A. Bell sur 6, 1¼ mi se of prod.	8-12-46	10- 3-46	1944	1939- 1944	Gunsight li; Penn	P 25	38	Ant; geol	Small producing area.
Brown	Cross Cut	R. H. Roark-L. F. Hooker et al's L. R. Cade 1, 330 ft out of nwc Labor 4, Lge 150, DeWitt Co. School Lds, 1⅝ mi se of prod.	5- 9-46	10- 3-46	4603	2996- 3013	Swastika sd; Penn	P 92	42	Ant; geol	Small prod area. Larger wells probable.
		WEST CENTRAL TEXAS—New Oil Pays									
Taylor	Reddin	Chas. J. Kleiner and Lee Heltzel's O. B. Fomby 1, 155 ft s and 600 ft w of nwc of John Beck sur 792, but in Wm B. Smith sur 155, offsetting shallow gas.	6-29-46	10-12-46	3151	3136- 3151	Ellenburger dolo; Ord	P 38; 140 wtr	40	Ant; geol	Predominance of wtr discounts import of strike.
		West Central Drlg. Co. et al's Buster Horton 5, 330 ft snl and 660 ft ewl Sub-div 1, D. B. Corley sur.	8-22-46	10- 5-46	2206	1845- 1849	Dothan li; Penn	F 96	40	Ant; geol	Dothan zn classed as "stray pay." Dual comp with 108 bbls. 41-gr natural fl fr Clippen open hole at 2190-2206 ft.
		WEST TEXAS—New Oil Fields									
Ector	Andector	Humble O & R Co.'s R. B. Cowden 1-B, c ne ne T&P Ry. 11, blk 45, T-2-N, 1⅞ mi ne of N, Goldsmith-Devonian fld disc.	7-22-46	10- 1-46	8600	8548- 8585	Ellenburger dolo; Ord	F 1176; 3/8"	44.2	Ant; geol	Subnormal gasoil ratio indicates wtr drive, thus accounting for sealing off of lwr sect of pay. No Devo or Sil, both prod in Goldsmith, N. fld, encountered. Four nearby tests underway.
Glasscock	Clark	Shell Oil Co.'s L. C. Clark 1, c ne sw T&P Ry. 5, blk 32, T-4-S, 9¼ mi se of nearest prod.	4- 1-46	10-18-46	10970	9740- 9755	Mississippi li; Miss	F 238; 15 wtr; 13/64"	56.5	Ant; geop	1st Mississippian prod for Permian Basin, but cost at this level out of proportion to normal yld per acre established in other dist. Logged 1112 ft of barren Ellen followed by 14 ft o Hickory before entering granite.
Mitchell	.....	Norman & Roche's S. R. Coleman-1, se se nw H&TC Ry. 70, blk 97, 3 mi nw of prod.	8- 7-46	9-20-46	2770	2560- 2770	Clear Fork li; Perm	P 67	25.3	Ant; geol	Broken pay; probably embraces substantial area with long-lived small pumpers.
		WEST TEXAS—New Oil Pay									
Ector	N. Goldsmith-Silurian	Phillips Pet. Co.'s R. B. Cowden-Bum 1, 667 ft snl and 1996 ft ewl T&P Ry. 3, blk 45, T-1-N, ⅛ mi se of Devonian disc.	6-25-46	10-10-46	8314	8255- 8280	Silurian li; Sil	F 226; 64 wtr; ½"	36.2	Ant; geol	Sharp structural relief recorded by pre-Permian beds due to absence of Devo. Ellen prod likely immediately ne and possibly e. Silurian prod in dist has not yet proved profitable.
		WEST TEXAS—Oil Field Extension									
Hockley	Levelland	W. V. Ballard and J. J. Cody's Mrs. C. D. Talley-Skelly 1, 440 ft out swc Labor 17, Lge 733, State Capitol lds, 1½ mi ne ext.	7-30-46	10-22-46	4845	4764- 4845	San Andres li; Perm	P 147; 10 wtr	31.8	Ant; geol	Rates among good wells in fld, which extends e & w 7½ mi without failure, but w portion is sub-marginal.
		UPPER TEXAS COAST—New Oil Pays									
Hardin	Saratoga, E. Flk.	L. M. Josey et al's Caswell Tr. 4, 533.5 fr sl 147-ac tr, BBB&C sur 72, 50 w of Caswell 2, e flk disc well.	9-27-46	10-22-46	6365	6027- 6097	Yegua sd; Eoc	F 215; 1/32"	39.2	SD	Import new sd for this old field.
Liberty	Hull, E. Flk.	American Republics Corp's Dolbear 175, 1280 fr el 2610 fr nl 800-ac tr and J. Devore Lge.	9- 3-46	10- 5-46	5700	4862- 4900	Yegua sd; Eoc	F 128; 1/8"	44.3	SD	.....
Madison	.....	**UPPER TEXAS COAST—New Distillate Field** West Prod. Co.-Noranda Oil Co.'s H. M. Boring 1, 467 out of nec 100-ac lse, Amy Boatright sur, 7½ mi sw Madisonville.	7-13-46	10- 7-46	12356	9613- 9630	Edwards li; L Cre	F 39; 1 mln; ¼"	55.8	.....	Not much additional develop seen, but indicates possible exploration on northern rim of Gulf Cst area for Cre production.
		LOWER TEXAS COAST—New Oil Pays									
Kleberg	Borregas	Humble's King Rch-Borregas 2, 7815 fr sl (at ra) 30,781 w of el (at ra) of 40,591-ac lse, Santa Gertrudis gr, 8 mi sw Kingsville.	7-29-46	10-31-46	8500	6364- 6380	Frio sd; Olig	F 138; 1/8"	42	.....	2nd comp in fld and 1st oil well. Disc was gas-cond. well.
Nueces	White Pt., E.	W. R. R. Oil Co.'s State-Nueces Bay (973) 5, (OWWO) 330 fr swl 161.6-ac lse, state tr 973, Nueces Bay.	.....	9-18-46	5863	5808- 5819	Frio sd; Olig	F 119; 1/8"	42.9	Flt	.....
Refugio	Refugio-Heard	Commercial Prod Co.'s Skelly Ryals et al 5, 298 fr nl 298 fr nly/sl 330 fr Ely/el 40.77-ac lse, 1 mi w Refugio.	.....	10- 6-46	7008	5400- 5408	Sd; Oligocene	F 122; ¼"	38	.....	.....
San Patricio	Midway	F. M. Boykin, Jr.'s H. H. Hutto 3, 467 fr wl 660 fr nl sect 81, Geo. H. Paul's sbdn Coleman-Fulton Pstr lds on 160-ac lse.	10-12-46	10-27-46	6057	5680- 5686	Frio sd; Olig	F 164; 3/64"	31	Sd lense	Good new sand for this field.
San Patricio	Sinton, W	Jones & Morgan's W. Ford 1, 330 fr s&wl blk 29, J. J. Welder sbdn, John Pollan sur and 28.6-ac lse.	9-15-46	10-23-46	5231	3460- 3468	.....	F 151; 90% wtr; 3/4"	21	.....	Important new development.
		LOWER TEXAS COAST—Oil Field Extension									
Bee	Cosden-Wilcox	Mackhank Pet. Co.'s W. D. Walton et al 1, 330 fr nwl 1263 fr swl 300.8-ac lse, 2300 fr swl 2900 fr nwl John Pace sur, 2⅝ mi sw ext.	7-30-46	9-29-46	7320	7066- 7072	Wilcox sd; Eoc	F 117; 1/8"	37	Flt	First oil well in fld. of prior gas-cond. prod.
		LOWER TEXAS COAST—New Distillate Pay									
Brooks	Dan Sullivan	Sun's D. J. Sullivan 6, 8300 e of wl El Tule gr, 660 n of Olmos Crk on 15.753-ac lse.	.....	9-15-46	13206	10275-10293	Vicksburg sd; Olig	F 102; 7.6 mln; ¼"	.....	.....	New deep sand for this 1944 disc.
		LOWER TEXAS COAST—New Gas Field									
Nueces	.....	Jack Little, Tr's Mrs. E. V. Rieber 1, 467 fr s&wl 60-ac lse and 400-ac tr J. J. de la Garza Montemayor & Sons gr, 1 mi n Richard King fld.	8-29-46	10-15-46	5797	5150- 5155	.....	9 mln; 1/2"	.....	.....	Unimportant.
		SOUTHWEST TEXAS—Oil Field Extension									
Starr	Sun	Humble's Saba Garza Pena et al 1, 467 fr sl 1251 fr wl 100-ac tr out of 283.36-ac lse, ½ mi n ext of se flk.	8-31-46	10-12-46	5258	4626- 4642	Frio sd; Olig	F 109; 3/64"	46	Ant flt	Important new ext. for this large fld.
		WYOMING—Oil Field Extension									
Washakie	River Dome	Pure Oil Co.'s Unit 3, sw sw 17-48n-92w, 1 mi se ext.	.....	10- -46	10151	10003-	Embar li; Perm	F 365; 9 mln; 1/4"	39	.....	.....

[1] Character of producing formations abbreviated thus: ch, chalk; dolo, dolomite; li, limestone; sd, sandstone; sh, shale; ser, serpentine; cgl, conglomerate. Ages of formations abbreviated thus: Pleis, Pleiocene; Plio, Pliocene; Mio, Miocene; Olig, Oligocene; Eoc, Eocene; U. Cre, Upper Cretaceous; L. Cre, Lower Cretaceous; Jur, Jurassic; Tri, Triassic; Perm, Permian; Penn, Pennsylvanian; U. Miss, Upper Mississippian; L. Miss, Lower Mississippian; Devo, Devonian; Sil, Silurian; Ord, Ordovician; Cam, Cambrian.
[2] Barrels of oil per day (24 hr. rate), flowing (F), pumping (P), swabbing (Sw), or bailing (B); or million cubic feet of gas daily open flow capacity; size of choke given in inches.
[3] Type structure abbreviated as follows: Ant, Anticline; D, Dome; Fld, Fold or Folded; Flt, Fault or Faulted; M, Monocline; N, Nose; SD, Salt Dome; Str trp, Stratigraphic trap; Syn, Syncline; Ter, Terrace.
[4] Method of discovery abbreviated as follows: cd, core drilling; dr, drilling; geol, geology; geop, geophysics; grv, gravity meter; ran dr, random drilling; seis, seismograph; sub, subsurface geology; sur, surface geology; tb, torsion balance.

Patent Roundup

A Regular Feature of THE OIL WEEKLY

In this column are reviewed patents dealing with drilling, producing and pipe line branches of the oil industry that are issued by the United States Patent Office.

Patents recently issued by the United States Patent Office, Washington, D. C., include those listed below.

Printed copies of the patents listed are furnished by the Patent Office for 25 cents per copy and can be had by addressing the Commissioner of Patents, Washington 25, D. C.

Oil Well Device

A device (Patent No. 2,402,886) has been patented by Paul H. Granger, Los Angeles, and is designed to inject fluids through a tubing string from the top of the well into the bore. It consists of a casing string having a pair of vertically spaced ports, a means to eject fluid by pump pressure through the tubing string from the lowermost port in the casing, and a means to control the ingress of fluid into the casing through the upper port.

Well Logging

Philip S. Williams, Tulsa, has assigned this well logging patent (No. 2,408,012) to Standard Oil Development Company.

It is a method of logging formations crossed by a well by delivering sharp hammer-like blows directly against the formations along the well wall and generating in the well electrical impulses which are a function of the resistance of the formations to the blows. The high frequency components of the electrical impulses, when transmitted to the surface, are segregated and recorded as a function of the resistance of the formations to the blows.

Slush Tube

This slush tube tool (No. 2,408,892) was patented by John C. Stokes, Houston, and assigned to Reed Roller Bit Company, Houston.

It is a combination of a bit having an aperture in which is set a bushing, a slush tube secured within a sleeve, the tube and sleeve being positioned and secured within the aperture and bushing. At one end the sleeve has a belled rim, and at the other end an axially cut lip or rim.

Well Logging Method

A well logging method has been patented (No. 2,408,965) by William E. Winn, Dallas, and Patrick F. Dougherty, Chester, Pa., and assigned to Sun Oil Company, Philadelphia.

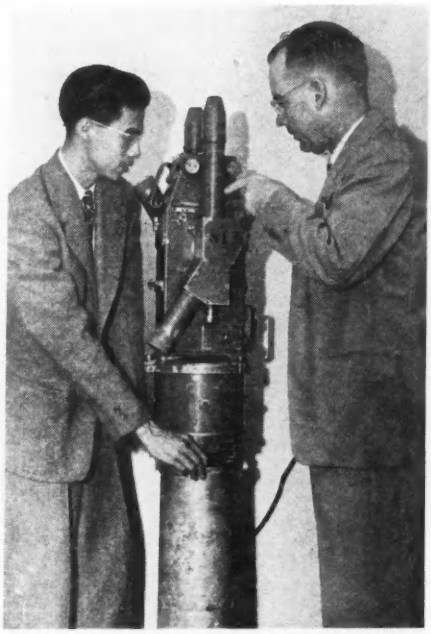
Oil wells may be logged by this method which comprises the treating of drilling mud taken from the well by separation from the drilling fluid and the cuttings, which are then mixed thoroughly with gaseous carbon dioxide at above atmospheric pressure effective enough to cause the gas to permeate the cuttings. The pressure is then lowered to remove the carbon dioxide from the cuttings along with any oil admixed there, and the mixture is subjected to a treatment which includes an analysis to determine the amount of hydrocarbons, thereby ascertaining the content of such hydrocarbons in the formation from which the cuttings were taken.

Well Logging Method

William E. Winn, Dallas, and Patrick F. Dougherty, Chester, Pa., have assigned this well logging patent (No. 2,408,964) to Sun Oil Company, Philadelphia.

This method of logging oil and gas wells that are drilled with the aid of a circulating drilling fluid determines the light hydrocarbon content of the drilling mud emerging from the well as indicating the nature of the formation penetrated regardless of variations during drilling in the properties of the mud which cause variations in its ability to retain hydrocarbons. A minor portion of the circulating fluid is diverted from the stream and subjected to a treatment in which materials are added to the mud that will impart uniform hydrocarbon-retaining properties to the portion under the stripping action of a gas, to which the treated mud is then subjected. The mixture of stripping gas and hydrocarbons are separated from the drilling fluid and given further treatment, including an analysis to determine the amount of hydrocarbons removed.

Gift Scientific



Indicative of the support which the oil industry is giving to educational institutions of this country is the double inclined beam torsion balance donated to the University of Tulsa by Stanolind Oil and Gas Company. V. L. Jones, assistant professor of geophysics at the university, is showing one of his students, Tan-Yin Chang, some of the fine points of the instrument which will be used for instructional purposes.

Well Tester

Luther E. Brown, Greggton and Ollin W. Williams, Mount Enterprise, Texas, have patented a well tester method (No. 2,404,825).

It consists of a tubular string of pipe to be lowered into a well and having separate openings in the tubular walls which may be closed by sleeve valves. An expansible packer around the string incloses one of the openings and has an inflow channel extending through the wall of the packer, opening outwardly from the packer at one end and continuing to an opening at its other end. A sample receiver with a chamber is lowered through the string, and has a means to seat in the valves and close the central bores of the valves in succession so as to trap the liquid between them. It is also movable to move the valves to an open position so that the trapped liquid between the valves may pass into the packer and expand it against the walls of the well to form a sealed off area of the wall. This permits the influx of a fluid sample through the channel, which has a communicating means with the chamber and allows entrance of the sample into the chamber.

Swing Joint

Patent No. 2,407,445, covering an electrical conducting swing joint, has been taken by Dwight M. Phillips, Calif., and assigned to Chiksan Tool Company, Brea, Calif.

The joint includes a tubular outer section of two detachably connected parts and receives a tubular inner section, with anti-friction bearing means in one of the parts connecting the section for free relative rotation and adapted to be removed from the outer end of the part. A sealing means in the part at the inner end prevents leakage of fluid from between the sections to the bearing, and is located and confined in the part by the other part, but can be removed by the disconnection of the parts. The second part has a contact means for maintaining the sections in electrical connection.

Well Logging Apparatus

This electrode device (No. 2,398,868) was patented by Robert W. Stuart and Daniel Silverman, Tulsa, and assigned to Stanolind Oil and Gas Company, Tulsa.

A device for use as one or more of the electrodes of an electrical well logging system consists of a gun provided with a bore in which a projectile electrode is placed, a means for driving the electrode from the bore, and electrically conductive means insulated from the gun for maintaining electrical connection with the electrode after it has been driven from the bore.

Radioactivity Recording

Shelley Krasnow, New York, and Leon F. Curtiss, Montgomery County, Md., have assigned this patent (No. 2,409,436) to Geophysical Development Corporation, Washington, D. C.

This apparatus for measuring radioactivity in deep wells contains a long narrow element sensitive to radioactivity and a means to indicate the radioactive intensity of rays impinging on the element; also a filter which serves to absorb a portion of the impinging rays.

Completions for Year To Approach 30,000

THERE have been 25,474 wells completed by the industry in the United States during the first ten months of this year compared with 22,518 in the comparable period of last year, an increase of 2956 wells or 13.1 percent.

During October, well completions totaled 2756 compared with 2642 in the previous month and 2602 in October of last year. The difference between the totals of October this year and last year was actually greater than is shown, because completion data were compiled for the previous period on a basis of 5 weeks, or 35 days, while the current October's were based on the calendar month, or 31 days.

With two months remaining in this year and the total of completed wells standing at 25,474, it appears that by the end of December that total will have increased to almost 30,000. This will make 1946, not only the leading drilling year since the start of World War II, but almost comparable with immediate prewar years, 1937-41, when wells were completed at the average rate of 30,500 annually.

So far this year there have been 13,298 wells completed as crude producers against 11,736 in the first ten months of last year, and 172 distillate wells against 122. Gas wells for this year totaled 2623 compared with 2333 a year ago. The number of dry holes drilled this year was 6934 against last year's 6201. Service wells, including air-gas and water input and salt water disposal wells, totaled 1908 this year against 1832 last year. Old wells that were deepened this year numbered 535 compared with 416 for the same period of 1945. These deepening operations are included in the completion totals that are mentioned above and that are shown in the accompanying table.

Texas' well completions for this year to the end of October totaled 7050 against 6160 for the same time last year, an increase of 14.4 percent, which was slightly over the lead that the nation, as a whole, held.

Drilling operations at the end of October were 3660 rigs actually drilling, 330 rigging up and 420 were shut down for an over-all total of 4410. At the beginning of the month there were 3674 drilling, 373 rigging up and 427 shut down for a total of 4474 operations. At the end of October, 1945, there were 4862 drilling, rigging up and shut down operations reported.

*Well Completions in the United States During October, 1946, and Cumulative for Year

(Figures compiled from weekly reports of Oil Weekly staff, with following exceptions: Illinois from Illinois Geological Survey; Indiana from Indiana Division of Geology; Missouri from Missouri Geological Survey; Bradford, Kane-Clarendon, Kane to Butler, and Allegany fields of Pennsylvania and New York from The Producers' Monthly.)

State or District	MONTHLY COMPLETIONS, October, 1946									Total Completions				CUMULATIVE TOTAL January-October				DRILLING OPERATIONS AT END OF MONTH					
	New Wells								Total Drld Dpr.									October, 1946				Sept., 1946 Total	Oct., 1945 Total
	Oil	Dist.	Gas	Dry	Wtr. Input	Gas Input	Wtr. Disposal	Total New		Oct., 1946	Sept., 1946	Oct., 1945	Footage October, 1946	Wells 1946	Wells 1945	Percent Diff.	Footage, 1946	Dr.	R.U.	S.D.	Total		
Alabama				1				1		1	3	4	4,335	14	31	— 54.8	59,011	7		3	10	3	9
Arizona				1				1		1			1,959	2			6,259					1	
Arkansas	6			9				15		15	16	20	48,429	157	161	— 2.5	596,929	29		4	33	24	50
California	123		4	34				161	3	164	147	208	636,408	1,587	1,832	— 13.4	6,671,974	201	45	39	285	281	332
Colorado	15			1				16		16	21	12	99,354	135	41	+229.3	861,667	56	4	5	65	67	76
Florida				1				1		1	4	2	5,286	22	13	+ 69.2	157,257	7		1	8	4	5
Georgia														2	6	— 66.7	8,441						
Illinois	114			98				212	3	215	276	136	542,711	1,951	1,576	+ 23.8	4,865,621	220	24	16	260	285	235
Indiana	26		2	21				49	4	53	47	36	87,787	427	288	+ 48.3	741,569	*41	13	12	66	72	70
Iowa															1	—100.0				1	1	1	
Kansas	85		27	70			3	185	11	196	172	176	591,070	1,810	1,430	+ 26.6	5,652,896	264	19	7	290	335	296
Kentucky	26		6	26				58		58	43	87	84,153	561	537	+ 4.5	931,974	45	11	8	64	76	98
Louisiana	78	4	7	45			1	135		135	135	107	782,012	1,173	881	+ 33.1	7,272,035	140	7	14	161	150	209
North Louisiana	47	1	7	24				79		79	80	51	278,037	670	349	+ 92.0	2,762,180	60	3	13	76	52	100
South Louisiana	31	3		21			1	56		56	55	56	503,975	503	532	— 5.5	4,509,855	80	4	1	85	98	109
Michigan	13		8	42		8		71		71	71	72	153,770	674	646	+ 4.3	1,513,970	78	11	19	108	121	161
Mississippi	17	1		10				28		28	26	36	220,254	202	322	— 37.3	1,467,298	58	8	1	67	56	54
Missouri				2				2		2		5	1,706	24	45	— 46.7	19,530	2			2	3	8
Montana	15		3	8				26		26	22	39	78,013	231	204	+ 13.2	544,658	51	4	6	61	61	76
Nebraska														3	3		5,616	4			4	7	4
New Mexico	25		3	4				32	5	37	50	49	144,264	384	367	+ 4.6	1,423,181	76	5	18	99	90	105
New York	54			1	31			86		86	102	102	118,711	972	954	+ 1.9	1,359,985	78	10	19	107	132	148
North Carolina														5	1	+400.0	26,173						
Ohio	42		68	40				150	3	153	139	129	400,920	1,110	848	+ 30.9	2,811,633	222	21	15	258	245	231
Oklahoma	215		22	146		1	3	387	11	398	311	191	1,119,102	2,663	1,955	+ 36.2	8,424,934	473	30	11	514	469	534
Oregon														2			17,148						
Maryland																		1			1		
Pennsylvania	118		55	18	99	24		314	5	319	350	365	549,619	‡3,500	‡3,381	+ 3.5	5,948,453	222	35	56	313	374	338
South Dakota											1	1		1	1		4,183	1		2	3	2	
Tennessee														2	3	— 33.3	1,618				†	5	1
Texas	392	12	34	237	1	2	3	681	9	690	609	714	3,007,948	7,050	6,160	+ 14.4	29,951,780	993	48	98	1,139	1,135	1,266
E. Tex. Border	6		12	6				24		24	12	18	133,873	162	94	+ 72.3	961,182	26	3	3	32	41	58
Rest of E. Texas	27		4	5			2	38		38	31	34	187,473	456	201	+126.9	2,325,367	55	1	5	61	64	60
North Texas	82			91	1		1	175	1	176	146	192	482,947	1,963	1,497	+ 31.1	4,966,684	145	3	6	154	154	212
W. Central	29		1	29		1		60	1	61	64	34	162,903	572	397	+ 44.1	1,487,140	78	5	39	122	131	119
West Texas	138		4	25				167	5	172	145	151	848,099	1,535	1,476	+ 4.0	7,398,045	399	10	21	430	413	430
Panhandle	13		4			1		18		18	31	53	54,289	309	516	— 40.1	864,108	81	5	4	90	85	99
Upper Coast	29	2		27				58		58	52	74	402,090	572	598	— 4.3	4,082,218	74	6	5	85	77	94
Lower Coast	48	10	6	22				86	1	87	90	107	543,941	967	885	+ 9.3	6,080,891	85	10	4	99	107	136
Southwest	13		2	24				39	1	40	24	40	126,165	366	415	— 11.8	1,230,812	30	5	3	38	31	33
S. Central	7		1	8				16		16	14	11	66,168	148	81	+ 82.7	555,333	20		8	28	32	25
Utah				1				1		1	1		2,107	5			14,329	4		3	7	7	9
Virginia														2			5,370						
Washington														1	1		6,230						
West Virginia	10		50	11				71	3	74	84	72	217,612	666	675	— 1.3	1,797,702	341	30	55	426	401	438
Wyoming	8		1	7				16		16	12	39	54,515	136	155	— 12.3	563,303	46	5	7	58	67	109
Total U. S.	1,382	17	290	834	131	35	10	2,699	57	2,756	2,642	2,602	8,952,045	25,474	22,518	+ 13.1	83,732,727	3,660	330	420	4,410	4,474	4,862

* Effective with data for September, 1946, figures are on calendar month basis. Previously, all statistics were for 4-week and 5-week months, explained when published.
† Data not available. ‡ Revised to include part of Kane-Butler, not previously recorded.

Heating Oils Output Jumps; Motor Fuel Down; Crude Production Up

The advent of colder weather in many parts of the U. S. was reflected by the refining industry's increased output of heating oils and relaxed production of motor fuel during the week ended November 16, according to The American Petroleum Institute.

Crude production during the week increased slightly over the previous week, while runs to stills remained practically the same. Stocks of burning oils began their seasonal declines and gasoline inventories started their winter advances, as the break in the unusually mild weather caused demand for these products to commence its about-face, which normally should have occurred several weeks ago.

Crude production in U. S. fields averaged 4,792,000 barrels daily in the week ended November 16, an increase of 13,000 a day over the previous week's rate, and 318,000 barrels or 7.1 percent over the daily output of the comparable week of last year.

Crude runs to stills in the week amounted to 4,716,000 barrels daily, for a small gain of 2000 a day over the daily runs of the previous seven-day period, but compared with runs of the corresponding period of 1945, they were 113,000 barrels or 2.5 percent greater.

Refinable crude stocks totaled 221,302,000 barrels on November 9, after being reduced 568,000 barrels during the previous seven days, according to the latest Bureau of Mines report. Stocks held at the time of the last report were 1,303,000 barrels or 6/10 of 1 percent more than the 219,999,000 barrels on hand November 10 of last year.

Gasoline production, including natural blended at the refineries, was cut back 319,000 barrels from the previous week's output to total 14,682,000 barrels, which was also 434,000 barrels or 2.9 percent less than was produced in the like period a year ago. Stocks of finished and unfinished gasoline started their seasonal climb during the week, when 1,257,000 barrels were sent to tanks, bringing the total to 88,220,000 barrels on hand, which are 6,552,000 barrels or 8 percent more than were held a year ago. This annual trend of gasoline accumulation has been delayed abnormally due to mild weather.

Distillate fuel oil output totaled 5,555,000 barrels in the week, a stepup of 154,000 barrels over the previous week's production, and 1,076,000 barrels or 24 percent more than was produced in the like week of last year. Stocks of home heating oils began their seasonal downswing during the week by dropping 65,000 barrels to the new level of 67,221,000 barrels, which are still 21,079,000 barrels or 45.6 percent more than were in storage a year ago.

Trends of Operations and Changes in Stocks

Figures on crude stocks are from Bureau of Mines weekly reports; all others from American Petroleum Institute weekly reports, which are estimates on Bureau of Mines basis.

(All figurs in thousands of barrels—add 000)

HIGHS AND LOWS OF RECENT YEARS

ITEM	Crude Oil Prod.		Runs to Stills		Crude Stocks		Gasoline Stocks		Gasoil and Distillate Stocks		Residual Fuel Oil Stocks	
	Barrels Daily	Week Ended	Barrels Daily	Week Ended	Barrels	Week Ended	Barrels	Week Ended	Barrels	Week Ended	Barrels	Week Ended
Highs:												
1941	4,337	11–22	4,120	10–18	266,187	3–29	99,727	3–29	54,983	11–15	102,448	1– 4
1942	4,337	2– 7	3,961	1– 3	263,208	3–28	[1]109,281	3–14	47,861	11–14	95,857	1– 8
1943	4,436	11–13	4,331	12– 4	245,752	5–29	94,159	3–20	47,187	11–27	72,881	1– 2
1944	4,762	9–30	4,798	12–30	240,992	1– 1	89,162	4– 1	48,162	10–28	64,744	10– 7
1945	4,944	7–21	[3]5,140	8–18	227,554	10–13	99,012	3–24	45,341	11–17	56,074	1– 6
1946	[4]4,961	6–15	4,911	8–31	[2]229,430	3– 2	105,233	2–16	[1]67,286	11– 9	61,636	11– 2
Lows:												
1939	[3]1,601	8–26	3,125	2–18	[2]229,127	10–12	71,152	10– 7	20,722	4–15	105,397	4– 3
1941	3,364	1–11	3,490	1–18	240,399	11–15	79,923	10– 4	28,382	4–12	90,914	7–13
1942	3,297	7– 4	3,393	5–23	231,896	12–12	75,934	12– 5	29,240	4–25	72,962	12–26
1943	3,821	1– 9	3,579	3–18	232,191	1– 9	68,182	10–16	30,732	4– 3	57,596	12–25
1944	4,357	1– 1	4,228	2–12	220,258	9– 9	76,302	1– 1	30,232	4–19	49,737	3–18
1945	3,621	10– 6	3,409	10–6	[4]211,813	8–25	70,791	10–13	26,483	3–17	38,548	5–26
1946	4,403	3– 9	4,498	1–12	218,193	1– 5	85,324	9–28	25,131	3– 9	37,289	4– 6

TRENDS OF 1946

Trends in Week Ended	Crude Oil			Gasoline		Gasoil and Distillate		Residual Fuel	
	Production Daily	Runs to Stills Daily	Stocks Week End	Production Weekly	Stocks Week End	Production Weekly	Stocks Week End	Production Weekly	Stocks Week End
1946:									
January 5	4,548	4,651	218,193	14,488	98,494	5,293	35,199	8,867	42,371
January 26	4,626	4,553	220,544	13,622	101,737	5,720	29,498	8,411	39,722
February 23	4,714	4,595	226,699	13,175	104,709	5,728	25,398	7,913	39,290
March 30	4,425	4,684	224,994	13,896	104,715	5,337	28,240	8,738	37,746
April 27	4,672	4,685	224,443	14,228	99,631	5,568	30,466	9,204	39,404
May 25	4,759	4,857	222,214	14,312	95,769	5,463	32,973	8,908	43,368
June 29	4,957	4,854	223,883	14,500	92,333	5,325	37,762	8,828	46,447
July 27	4,926	4,896	223,756	14,535	88,626	5,817	44,316	8,217	49,517
August 31	4,833	4,911	227,132	15,014	87,217	5,630	53,134	8,539	53,173
September 28	4,778	4,829	223,043	14,675	85,324	5,632	59,827	8,172	57,657
October 26	4,730	4,758	221,184	14,863	86,423	5,710	65,499	7,728	60,872
November 2	4,759	4,769	221,870	14,594	85,930	5,371	65,943	7,434	61,636
November 9	4,779	4,714	221,302	15,001	86,963	5,401	[1]67,286	7,503	61,340
Nov. 16, 1946	**4,792**	**4,716**	.....	**14,682**	**88,220**	**5,555**	**67,221**	**7,644**	**60,552**
Nov. 17, 1945	4,474	4,603	[5]219,999	15,116	81,668	4,479	46,142	8,684	45,599
Change:									
In Week	+13	+2	—568	—319	+1,257	+154	—65	+141	—788
In Year	+318	+113	+1,303	—434	+6,552	+1,076	+21,079	—1,040	+14,953
In Year	+7.1%	+2.5%	+0.6%	—2.9%	+8.0%	+24.0%	+45.6%	—12.0%	+32.8%

[1] All time peak. [2] Lowest between January, 1922 and July 1, 1944. [3] Lowest since October, 1922 due to shutdown of six Mid-Continent states. [4] Lowest since December, 1921. [5] Stocks, November 10, 1945.

Crude Prices at New Levels In Southwest, Mid-Continent

Last week saw crude prices throughout the Southwest hit higher levels and then spread quickly into the Mid-Continent, with almost all other crude-producing areas expected to follow the lead.

Initiation of the price boost came with Sun Oil Company's announcement of a new schedule raising the prices it will pay for coastal Texas and Louisiana crudes 5 to 28 cents a barrel. Although Sun's announcement came as a surprise to all other buyers in the area covered by the hike, it was only a matter of a few days before other major buyers began to follow. Prior to Sun's announcement of general raises, The Atlantic Refining Company had posted a 10-cent boost in its price for crude from Barber's Hill field on the Texas Gulf Coast. This raise became effective November 1.

Humble Oil & Refining Company, which purchases crude in a much wider area than that covered by the two leaders' revisions, delayed several days before announcing its raise of 10 cents per barrel on most of its purchased crude and 20 cents basically on some low cold test and low gravity crudes.

Phillips Petroleum Company advanced the prices it will pay for Oklahoma, Kansas and Texas Panhandle crude 10 cents per barrel. A comparable boost was made by Sohio Petroleum Company for crude from North Central Texas, Oklahoma, Kansas, Mississippi, Michigan, Illinois, Indiana and Kentucky.

The raise was extended into the Rocky Mountain region by The Texas Company with posting of a 10-cent-a-barrel advance for Colorado, Montana, New Mexico and Wyoming crudes. The same company is meeting increases in Texas, Louisiana, Kansas and Illinois.

Continental Oil Company's new schedule calls for a 10-cent increase on all grades, and Globe Oil & Refining Company announced it would meet the raises in fields in which it purchases.

There have been no reports of price increases being paid for Pennsylvania grade crudes, but Ohio's Corning grade is said to be up 10 cents to $1.76.

☆ California

Kern County Has Schist Strike; State's Depth Record Broken

Western Gulf makes schist discovery in Kern County; Pacific Western's deep test breaks California depth record; Kettleman Hills South Dome wildcat abandoned; prospecting activity increasing in Castaic area; biggest well to date completed at West Newport Beach; Lanare field extended ¼ mile; San Bernardino County wildcat has oil shows.

Kern County: Western Gulf Oil Company has made an oil discovery in fractured schist in the Arvin area off the southeast end of the Mountain View field. Operator's DiGiorgio 1, 10-31s-29e, was swabbed in, flowing 400 barrels of 31.6-gravity oil, 1.7 percent cut, through 22/64-inch choke. Depth is 6163 feet with 7-inch casing cemented at 5877 feet and 357 feet of 5-inch, including perforations from 5935-6160 feet, landed at 6161 feet. Production later increased to 480 barrels.

Pacific Western Oil Corporation's deep Vedder test, National Royalties 1, 5-26s-22e, has passed the California depth record and is drilling toward a new world's record. Contractors, Loffland Bros. Company, have drilled the well to 16,311 feet in 199 days. This is believed to be the deepest hole ever drilled without a fishing job.

Two important tests were abandoned during the last week, both by Tide Water Associated Oil Company-Operator's Kettleman Hills South Dome wildcat, Fee 65-18, 18-25s-20e, quit after finding no commercial showings to 4000 feet. Its Kern River field deep test, M. & S. 113, 29-28s-28e, was abandoned at 6152 feet after drilling into Granite at 6145 feet.

On property twice quitclaimed as unproductive in the Midway-Sunset field, Quality Oil Company has completed Quality 3 in 30-32s-24e for 175 barrels of 21.3-gravity practically clean oil. Total depth is 2558 feet.

The Superior Oil Company has completed Anderson 47-35 in the Paloma field in near-record time. The crew drilled to 11,657 feet and set 2 strings of pipe and a liner in 60 days.

Los Angeles County: Universal Consolidated Oil Company has staked location for Devils Canyon 1, wildcat in the Castaic area northeast of the Oak Canyon field. Standard Oil Company of California and The Texas Company have contributed dry hole money and Southern California Petroleum Corporation has contributed acreage. Location is in 27-5n-17w. In 1914, Shell Oil Company drilled a well in Section 20 which was abandoned at 7006 feet. The new project is noteworthy because of increasing interest in the Castaic area by prospectors after 20 years of inactivity.

Orange County: Barnhart-Morrow Consolidated's Alford 2, 18-6s-10w, the West Newport Beach field, has been completed flowing 900 to 1000 barrels of 22.6-gravity oil through 28/64-inch choke. This is by far the largest well completed to date in this area.

San Bernardino County: Oil shows are reported in Grayco Oil Company's Well No. 1 in 13-3s-8w, near the town of Chino. Operator is running a string of 8⅝-inch casing and will set at 2920 feet and will make open hole tests from 2930 feet to bottom at 4170 feet.

Fresno County: The Lanare field has been extended approximately ½ mile northwest by Pacific Western Oil Corporation's Brix-Francis 1, which flowed 300 barrels of 38-gravity oil through 12/64-inch choke.

☆ Oklahoma

Soldier Creek Extended; New Okfuskee Gas Field

Soldier Creek pool extended on two sides; dual-zone producer completed in Southwest Wayne pool; Phillips discovers new pay zone in Wilzetta pool; Carter abandons deep wildcat in McClain County; two Garvin County wildcats get oil on tests; new gas pool opened in Okfuskee County.

Cotton County: The current play, which has been in progress the past few weeks, centered on the Soldier Creek pool, when the field, southwest of Walters, was extended ¾-mile to the north by Martin Corporation's Dyer 1, SW SW SE 32-3s-11w. The well flowed an estimated 500 barrels of oil a day and is shut-in for tubing and final tests. Pennsylvanian sand pay was found from 1630-39 feet, with a second pay streak at 1650-51 feet. A. R. Dillard extended the pool ½-mile to the northwest with his Enright 2, NW NW SW 4-3s-11w, which started flowing while drilling in at 1649 feet. No estimate has been made of its potential.

S. F. Hutcheon's Calloway 6, 6-3s-11w drilled plug to the top of the sand at 1617 feet, with pay bottomed at 1627 feet, and when the well kicked off it flowed a solid oil stream through 7-inch casing into pits and tanks. Estimates of its production are set at from 1200 to 1500 barrels per day. The well was successfully killed so that crew could run tubing.

McClain County: Big Chief Drilling Company's White 1, NE SE SE 28-5n-2w, which opened a new pay zone for the Southwest Wayne field, has been dually completed, making 17 barrels of oil per hour through ⅛-inch choke from the Pennsylvanian, and 13 barrels from the Hunton. The well is on the west side of the pool, opened in August. The discovery well produces from the Pennsylvanian.

The Carter Oil Company abandoned its Hastings 1, C SE NW 29-7n-3w, a wildcat north of the Iron Chappel pool, after running electrical log to 10,898 feet, total depth. On a drill-stem test, the

Wells Completed in United States in Week Ended November 16, 1946

Data preliminary and subject to revision. Revised and more complete data on all completions shown in monthly summary published in last issue of each month.

State or District	FIELD COMPLETIONS: New Wells *Oil	Dist.	Gas	*Input	Dry	Total	Old Wells Deepened	WILDCAT COMPLETIONS *Oil	Dist.	Gas	Dry	Total	ALL COMPLETIONS This Week	Last Week	This Week 1945
Alabama	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1
Arizona	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....
Arkansas	....	....	....	....	....	....	....	....	....	....	1	1	1	6	....
California	34	....	1	....	....	35	1	2	....	....	4	6	42	35	39
Colorado	4	....	....	....	....	4	....	....	....	....	....	....	4	1	2
Florida	....	....	....	....	....	....	....	....	....	....	2	2	2	1	....
Illinois	27	....	....	....	15	42	1	2	....	....	10	12	55	44	52
Indiana	6	....	....	....	4	10	....	....	....	....	2	2	12	12	....
Kansas	18	....	17	1	9	45	2	....	....	....	12	12	59	51	39
Kentucky	8	....	....	....	11	19	1	....	....	....	3	3	23	15	....
Louisiana	18	1	2	....	4	25	....	....	1	....	3	4	29	32	22
North Louisiana	14	1	2	....	1	18	....	....	1	....	....	1	19	17	16
South Louisiana	4	....	....	....	3	7	....	....	....	....	3	3	10	15	6
Michigan	6	....	....	....	6	12	....	....	....	....	3	3	15	15	14
Mississippi	1	....	1	....	....	2	....	....	....	....	2	2	4	12	9
Montana	....	....	1	....	3	4	....	....	....	....	1	1	5	4	6
New Mexico	2	....	....	....	....	2	....	....	....	....	....	....	2	10	4
New York	15	....	....	10	1	26	....	....	....	....	....	....	26	26	25
Ohio	4	....	14	....	11	29	1	....	....	....	1	1	31	33	10
Oklahoma	75	....	1	3	6	85	2	2	....	....	9	11	98	84	53
Pennsylvania	27	....	7	15	2	51	2	....	....	....	....	....	53	48	42
Texas	70	3	3	1	25	102	2	4	2	....	20	26	130	158	124
E. Tex. Bor. Co.	....	....	3	....	1	4	....	....	....	....	....	....	4	3	2
Rest of E. Texas	2	....	....	....	....	2	1	....	....	....	....	....	3	6	6
North Texas	19	....	....	1	9	29	1	1	....	....	7	8	38	33	33
W. Central Tex.	....	....	....	....	1	1	....	2	....	....	1	3	4	20	12
West Texas	28	....	....	....	5	33	....	....	....	....	1	1	34	46	26
Texas Panhandle	2	....	....	....	2	4	....	....	....	....	....	....	4	3	3
G. Coast, Upper	4	1	....	....	3	8	....	....	1	....	3	4	12	13	15
G. Coast, Lower	15	2	....	....	1	18	....	1	1	....	3	5	23	16	17
Southwest Texas	....	....	....	....	1	1	....	....	....	....	4	4	5	15	8
S. Central Tex.	....	....	....	....	2	2	....	....	....	....	1	1	3	3	2
West Virginia	2	....	7	....	2	11	1	....	....	....	....	....	12	18	15
Wyoming	1	....	....	....	....	1	1	....	....	....	1	1	3	4	8
Total U.S.	318	4	54	30	99	505	14	10	3	....	74	87	606	610	465

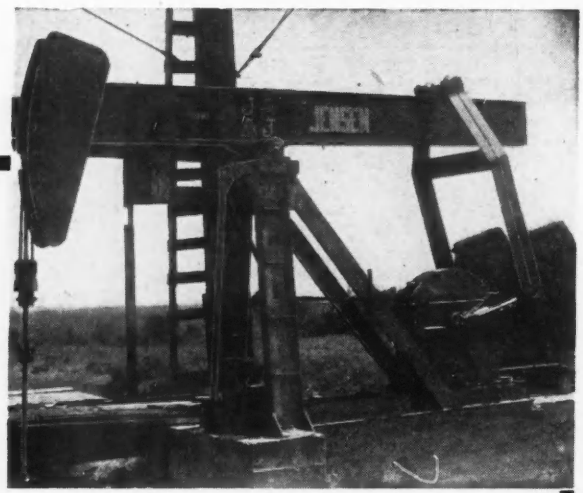
* Includes salt water disposal wells.

well recovered 10 feet of oil and 180 feet of gas-cut mud from the Bromide, but on a 90-minute test, taken from 10,862-86 feet, there were no shows.

Lincoln County: A new pay zone in the Wilzetta pool discovered by the Phillips Petroleum Company's Earlabaugh 7, NE NE NE 34-13n-7e, showed an estimated 6 million feet of gas from the Prue sand, from 3225-65 feet, and on a drill-stem test recovered 180 feet of 40-gravity oil, with 60 feet of oil- and gas-cut mud. Operators will drill to the Hunton lime before completing.

Garvin County: Two outposts to the Maysville area have returned oil on drill-stem tests: R. H. Dearing & Sons et al's Hope 1, NE NW SE 32-4n-2w, southwest of the area, and Standard of Kansas' Eskridge 1, NE SW SW 18-4n-2w, to the north. The Hope 1 ran a one-hour test at 6234-48 feet in basal Pennsylvanian, with gas showing in 35 minutes, and at the end of the test recovered 5 feet of 41-gravity green oil, and 135 feet of heavily oil-cut mud. The Eskridge, making a 50-minute test at 7343-76 feet, had gas in 7 minutes, and a heavy oil spray in 32 minutes. Its flow was estimated at 5 barrels per hour, with 3 million feet of gas a day.

Okfuskee County: A new gas field has been opened southeast of Okemah by Ralph Fillmore, II, of Oklahoma City, whose Palmer 1-A, C SE NW 34-11n-10e, is making an estimated 3,500,000 feet of gas a day from the Gilcrease sand, 3050-92 feet. Total depth is 3123 feet. Location is on a 700-acre structure, all leases being held by Fillmore.



1919-?

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☆ Kansas

New Three-Zone Pool Seen for Marion County

Oil pool opened in Marion County; Ellis County pool opener completing successful wildcat revives old Virgil area of Greenwood County.

Marion County: Anderson-Prichard Oil Corporation has opened a new oil field west of Hillsboro, which may prove to have three producing horizons. The Weyand 1, SE NW SW 27-19s-1e, swabbed 65 barrels of clean oil, with no water, in five hours from the Simpson sand, topped at 3289 feet. Prior to this, a drill-stem test of the Mississippi lime, taken from 2790-810 feet, showed gas, with 925 pounds bottom-hole pressure. A drill-stem test in the Viola lime, from 3211-16 feet, recovered 270 feet of clean oil, and 30 feet of mud, in 45 minutes. The corporation owns about 2500 acres, which is believed to cover the entire structure.

Ellis County: The Texas Company's pool opener, Dreiling 1, SW SW SW 15-13s-17w, is being completed in the Arbuckle lime, following a swab of 60 barrels of oil in 1½ hours, 1900 feet off bottom. Crew is now putting the discovery on the pump. Arbuckle was topped at 3560 feet, and the producing zone is from 3560-83 feet. It is 2 miles south of the Catherine pool.

Greenwood County: The old Virgil area apparently has been revived by Dwight Wilson's Barnett 1, wildcat NW SW NW of 13-14s-12e. The well is producing oil at the rate of 106 barrels per day from Mississippi 1717-23 feet.

Humble Announces Changes In Production Department

Three changes in Humble Oil & Refining Company's Production Department supervisory forces were announced here recently.

M. L. Hambrick, assistant district chief clerk of the Pickton district, Pickton, Texas, has been transferred to the Darrow district, Geismar, La., and promoted to district chief clerk.

O. A. Griffin, district chief clerk of the Flour Bluff district. Corpus Christi, Texas, has been transferred to the Imogene district, Pleasanton, Texas.

J. R. Goddard, district chief clerk of the Imogene district, Pleasanton, Texas, has been transferred to the Flour Bluff district, Corpus Christi, Texas.

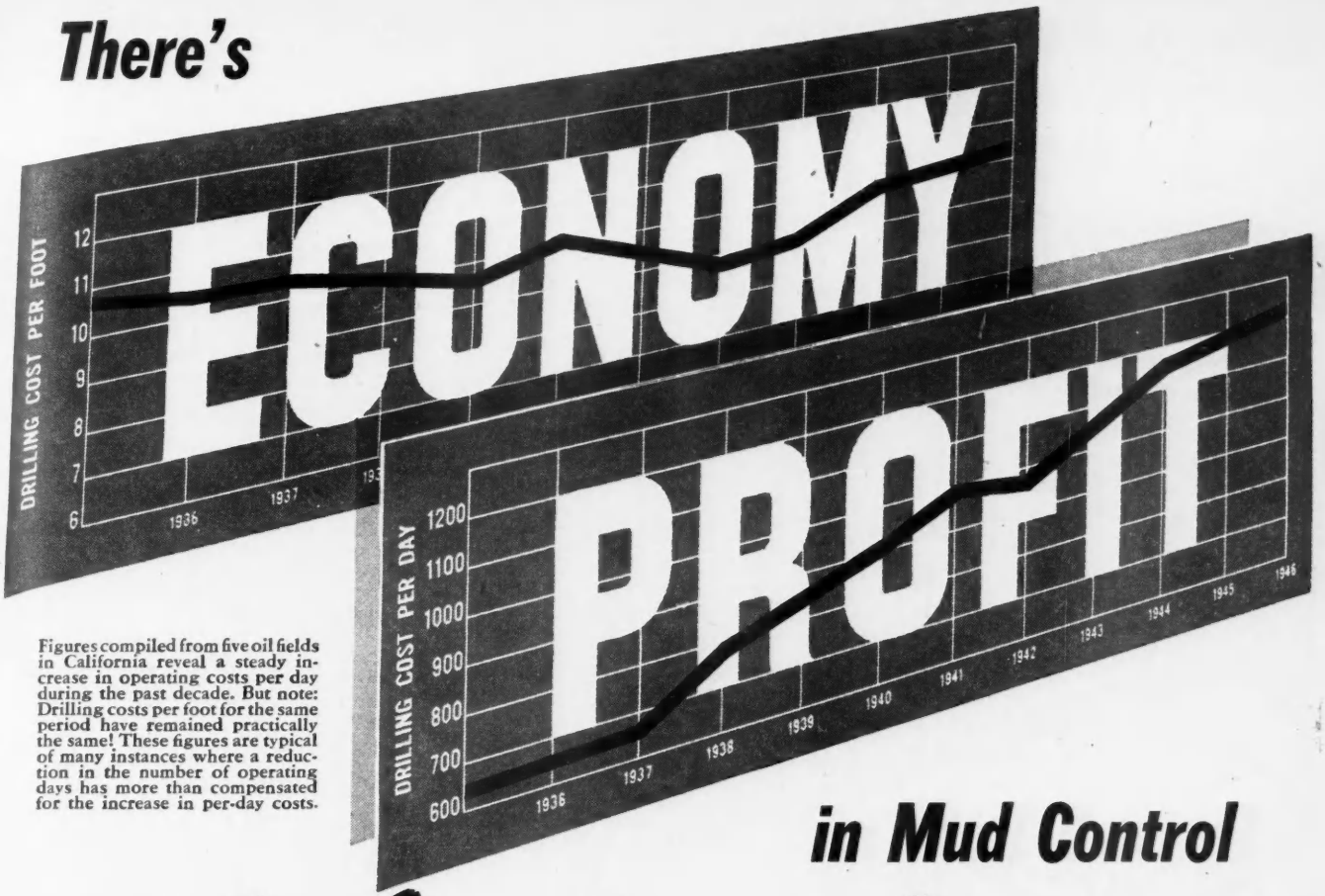
To Test Gas

The Oklahoma State School Land Commission has employed M. L. Mayfield of Houston, president of Production Engineering Service, to run tests on gas delivered from Sinclair Prairie Oil & Gas Company's wells in the Oklahoma City pool, in efforts to bolster the state's contention that back royalties amounting to about $119,000 are due for operations from 1931 to 1945. Oklahoma recently filed suit to collect back royalty payments alleged as due.

Indian Lands Offered

Sealed bids for oil and gas leases on restricted Indian lands will be opened at the Kiowa Indian Agency in Anadarko, Okla., at 10 a.m., December 11. A total of 18,095.83 acres are being offered, in Stephens, Comanche, Caddo, Tillman and Cotton counties.

There's ECONOMY in PROFIT in Mud Control with Aeroflo* and Quadrafos*



Figures compiled from five oil fields in California reveal a steady increase in operating costs per day during the past decade. But note: Drilling costs per foot for the same period have remained practically the same! These figures are typical of many instances where a reduction in the number of operating days has more than compensated for the increase in per-day costs.

‡AEROFLO and †QUADRAFOS are available for immediate delivery from stocks kept by many drilling mud chemical distributing houses in all principal oil well drilling centers in the United States.

‡AMERICAN CYANAMID COMPANY
(Manufacturer and Selling Agent)

†RUMFORD CHEMICAL WORKS
(Manufacturer)

†AMERICAN CYANAMID COMPANY
(Selling Agent)

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SEE PAGE 2

☆ West Texas

Coke County Discovery from Crinoidal Starts Lease Play

Coke County discovery from Crinoidal by Sun Oil Company starts large lease play; San Andreas lime strike indicated for Andrews County; Schleicher County wildcat has nominal oil show after acidizing Permian.

Coke County: Sun Oil Company's Jameson 1, C SE SW H&TC Railroad 253, Block 1-A, and on a 15,000-acre block acquired after geophysical surveys, was setting 7-inch casing at 6225 feet to try for completion after indicating production in the Crinoidal (Basal Pennsylvanian). A drill-stem test at 6204-30 feet yielded gas to the surface at an estimated rate of 2 million cubic feet daily, while the recovery included 200 feet of 45-gravity sweet green oil and 10 feet of oil-cut mud. Broken pay was encountered in core at 6210-20 feet, while the next 10 feet showed good porosity. If the Crinoidal fails to make a commercial producer, the test will be deepened to Ellenburger as originally planned. Production from the Crinoidal is rare in the state, but this zone has a good record in the Big Lake and Todd areas. Sun will likely monopolize the productive area through having added to its holdings in Coke and Mitchell counties the past week. Other buyers were competing for lease protection in anticipation of a series of fields. The well is 27½ miles southeast of the Westbrook field, nearest important area. Coke County has an inactive stripper-well pumper in the Blackwell pool.

Schleicher County: L. W. Elliott, Trustee's Tisdale 1, 4½ miles northwest of the Page field, was showing comparatively little oil and gas after using 3000 gallons of acid through Basal Permian perforations at 2654-92 feet. It is due to perforate opposite broken pay in the Pennsylvanian at 2709-70 feet, where drill-stem tests yielded oil-cut mud. The Cisco was entered at 2709 feet, with elevation of 2424 feet.

Andrews County: Union Oil Company's Means 1-F, C NW NE PSL 1, Block A-46, and 2⅓ miles southwest of production, headed oil and shot residue briefly after 180-quart nitro shot at 4615-90 feet, having plugged back from 4702 feet. A marginal pumper is anticipated. The Grayburg was topped at 4300 feet, with elevation 3191 feet.

Shell Oil Company's Scarborough 1-E, offsetting Clear Fork production in the Union field and a failure in Ellenburger, topped at 9380 feet, has set pipe at 8010 feet after plugging back from granite at 9714 feet to 8080 feet. An attempt will be made to complete from nominal show in Basal Permian.

Placid Oil Company and Gulf Oil Corporation's Thornberry 2-B, 2½ miles east by north of the partnership's pumping Ellenburger discovery for the Hunt area, was drilling at 10,088 feet, having entered the Woodford at 9980 feet, or 536 feet low.

Humble Oil & Refining Company's Sims 2, 3⅛ miles northwest of the Ellenburger discovery in the Nelson area and near the New Mexico border, was fishing at 10,423 feet in Simpson, topped at 9690 feet, or 11 feet high to the nearest producer.

Pecos County: Helmerich & Payne, Inc.'s White-Baker 9-C, ⅝ mile west by north of an Ellenburger failure in White & Baker field, was drilling dry dolomite at 10,035 feet in Ellenburger, topped at 9492 feet, correlating about 40 feet low. It will continue to water.

Midland County: Humble's Turner 1, 2 miles south by east of its Strawn discovery in the Midland field, was preparing to run pipe after failing to complete drill-stem tests at 11,377 and 11,391 feet in Devonian, topped near the 11,360-foot level, or about 50 feet high to the plugged-back discovery.

Mitchell County: Tobe Foster et al's Womack 1, NWc Block 5, and 9/16 mile south of the Coleman Ranch pool discovery, correlates higher structurally and is showing for a larger producer after a 470-quart nitro shot in Clear Fork 2678-2775 feet. Considerable drilling has been scheduled by independents in this new pumping area.

Ector County: Mid-Continent Petroleum Corporation's TXL 1-D, C NW SE T&P Railroad 21, southeast edge of the TXL field, exhausted its Ellenburger oil flow from perforations at 9795-9835 feet due to predominance of water, but reestablished production by plugging back to the Devonian. A natural flow of 651 barrels of 40-gravity oil, gas-oil ratio 1870/1, through ½-inch choke was developed from Devonian perforations at 7700-7845 feet. It is the highest Devonian producer on the structure, and the first for this zone within the Ellenburger sector.

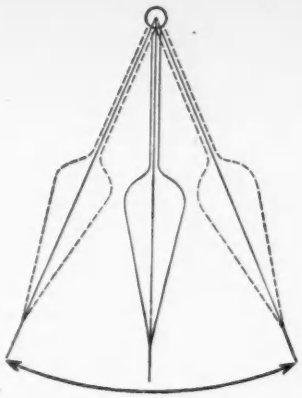
Skelly Oil Company's Thomas 1, C SW SE T&P Railroad 42, T-1-N, northeast edge of production, emphasized the possibilities of the Silurian pay, which is confined to portions of the Ellenburger sector of the TXL field, in flowing 151 barrels of 36.7-gravity oil, with gas-oil ratio 387/1, on 2½-hour gauge through tester at 8246-8325 feet. The Fusselman section of the Silurian was topped at 8245 feet with elevation 3325 feet. It will continue to the Ellenburger. The Devonian sector of the field offers comparatively few additional locations for drilling, unless extensions are recorded, while the prolific Ellenburger zone will account for 50 additional completions, more or less.

Clyde Williams Elected Head of AIME for 1947

Clyde E. Williams, director of the Battelle Memorial Institute at Columbus, Ohio, has been elected president of the American Institute of Mining and Metallurgical Engineers for 1947. Vice presidents elected were Andrew Fletcher, vice president of St. Joseph Lead Company, New York; and Robert W. Thomas, general manager of the Nevada Consolidated Copper Corporation, Ray, Ariz.

Six directors elected were: Oliver Bowles, chief of the Nonmetallic Economics Division of the U. S. Bureau of Mines, Washington; Arthur John Blair, chief geologist, Tennessee Coal, Iron and Railroad Company, Birmingham, Ala.; William W. Mein, Sr., president, Calaveras Cement Company, San Francisco; C. V. Millikan, production engineer, Amerada Petroleum Corporation, Tulsa; Earle E. Schumacher, chief metallurgist, Bell Telephone Laboratories, Murray Hill, N. J.; and John R. Suman, vice president of the Standard Oil Company (New Jersey), New York.

Dr. A. B. Parsons is secretary of the Institute.



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☆ Central West Texas

Jones County Test Has Gas; Four Wildcats Fail in Area

New pay in Jones County area yields gas, and 4 wildcat failures listed for county; Ellenburger production in East Ibex field extended south.

Jones County: R. H. Roark et al's Winters-Humble 5, NE SE T&P Railway 40, Block 18, offsetting shallower oil production in the Noodle field, tested 5 million cubic feet of gas daily from perforations at 3730-50 feet in Canyon, having plugged back from water in Ellenburger at 5383-5405 feet. It will be perforated higher in the new pay zone to try for oil flow.

Humble Oil & Refining Company's Graves 8, twin location to a 2500-foot producer in the Noodle field, is rated among the largest wells in the county in recording a natural potential of 2006 barrels of 45-gravity oil through choke from the Home Creek at 3317-70 feet.

Jones-Stasney & Mohawk Drilling Company's Hicks 1, 5 miles south of Avoca, was abandoned at 4975 feet, having entered the Reef lime at 2825 feet and the Palo Pinto at 3286 feet with elevation 1628 feet.

Stephens County: L. C. Harrison et al's Compton 1, NE NE NW Sect. 8, one of the largest Ellenburger producing areas in the district, Orphan Asylum Lands and ½ mile south of the East Ibex field, flowed 220 barrels of 45-gravity oil on 7-hour test through ¼-inch choke after acidizing open hole at 4277-4294 feet in Ellenburger topped at 4267 feet. Rig has been skidded 933 feet west for a new test, while Wittmer-Knight and Ewing are starting an east offset.

Fisher County: Horne Oil Company's Wheeler 1, George Creath Survey and 3 miles northeast of the Eskota pool, failed to encounter the Reef lime and was slated to abandon at 4630 feet. Skelly Oil Company's Huddleston 2-A, southeast offset to its Eskota field discovery, was making production test of Palo Pinto lime pay at 4410-47 feet after confirming production with 5 drill-stem tests at intervals in the section. The Reef lime was entered at 4400 feet. The company's Huddleston 3-A, east by north of the discovery, is a marginal pumper.

W. A. Alexander

E. G. Robinson

Shell Establishes New Areas, Announces Personnel Changes

Shell Oil Company's expansion of exploration, production and related activities has resulted in organizational changes in personnel, according to A. J. Galloway, vice president, Houston.

The regional offices will remain in Houston, where an advisory staff has been appointed to coordinate the company's operation in specialized services throughout the area east of the Rockies. For administrative purposes, four areas have been established, including the present Tulsa area and three new areas in Midland, Texas, Houston, and New Orleans. The Tulsa area will continue under R. B. Roark, vice president and manager. W. A. Alexander was named manager of the Houston area; B. Dykstra, manager of the Midland area; and E. G. Robinson, manager of the New Orleans area.

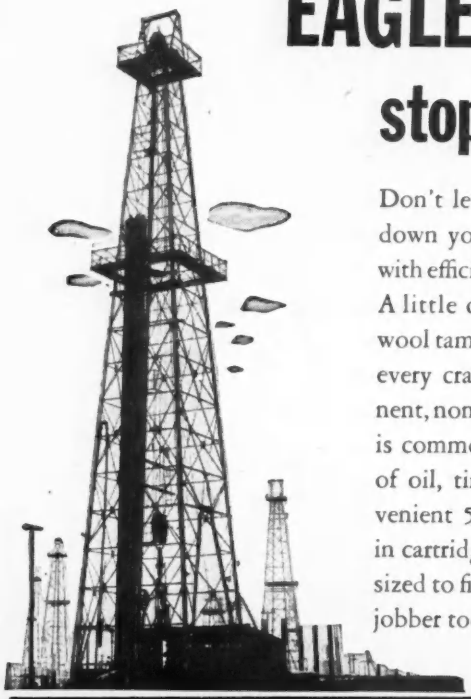
Alexander, a graduate of Louisiana State University in 1928, joined the old Roxana Petroleum Corporation, which later came into Shell. He has served as exploitation engineer, district superintendent, division production manager and assistant production manager for the Texas-Gulf area.

Dykstra, associated with Shell since 1926, has had extensive production experience in Roumania, Sumatra and Colombia as well as in the U. S.

Robinson has been with Shell since 1925, when he served as district geologist at San Antonio. His latest position was that of exploration manager of the Texas-Gulf area.

Plant Shut Down

Danciger Oil & Refineries, Inc., has discontinued operation of its 7000-barrel daily capacity crude skimming and cracking plant near Pampa, Texas. This plant began operation March, 1930, and was processing 6000 barrels daily of Texas Panhandle crude obtained by the company's 25-mile gathering system and other lines through the exchange of East Texas field crude controlled by Danciger.



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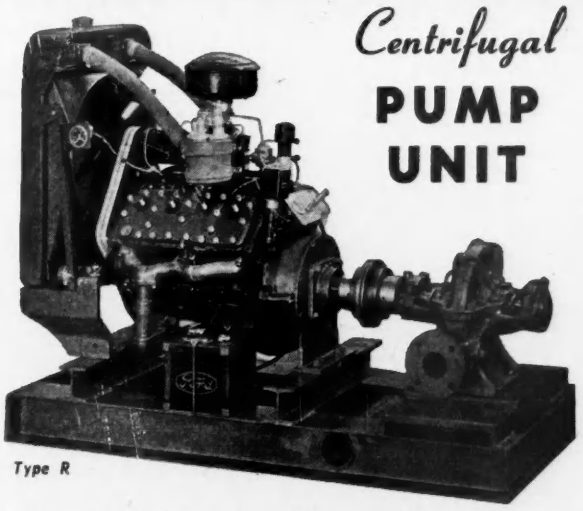

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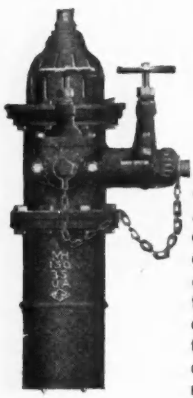

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☆ North Texas

Clay County Has Prolific Oil Strike in Bend Conglomerate

Northeastern Clay County has prolific oil discovery in Bend conglomerate; Wilbarger County wildcat responds to acid treatment, and second strike for county pending; semi-wildcat in Montague County shows promise of production.

Clay County: Jack Grace et al's Bryant Edwards 1-C, S. C. Beldon Survey A-12, 2½ miles northwest of the Hapgood field and 3¼ miles west of the Spring sector of the Ringgold field, flowed 150 barrels of oil natural on 2-hour gauge through ½-inch choke from conglomerate at 6070-88 feet. The Bend was entered at 5905 feet with elevation 932 feet. This strike is a northwest offset to the owner's Edwards 1-B, which has been showing for a small pumper in Strawn at 5479-5503 feet. The latter will be deepened to the prolific zone, while a south offset to the discovery is to be drilled.

Wilbarger County: National Associated Petroleum Company and The Texas Company's Couch 1, NW NW NE H&TC Railroad 24, Block 16 and 6 miles southwest of the Odell field, was showing for a flowing producer after reacidizing Canyon perforations at 5023-83 feet. This wildcat swabbed 135 barrels of oil on 18-hour test following initial treatment with 1000 gallons of acid under maximum pressure of 1625 pounds.

Paradise Oil Company's Waggoner 1-I, SE SE H&TC Railroad 11, Block 14, 1¾ miles north by east of nearest production, recovered 2000 feet of oil when tester was used in oil-saturated lime in the Canyon at 3156-63 feet, and was drilling below 3830 feet to fulfill 4500-foot depth contract before running pipe for completion.

Montague County: Continental Oil Company's Copeland 1, N. Kimbro Survey A-405, semi-wildcat, was making a drill-stem test in oil-saturated conglomerate at 5976 feet, having entered the Bend at 5900 feet with elevation 884 feet. It is 1¼ miles west by north of the most northerly production in the Hildreth field, and the same distance north by east of the North Stoneburg area. The Bend marker correlates about level with each producing area, but intermediate dry holes partially separate same.

Nu-Enamel Oil Operating Company's Perry 1, L. S. Farrer Survey A-282, and 3 miles west of St. Jo, was making production test of 3 zones of oil sand between 1657 feet and 1695 feet, with 7-inch at 1653 feet. This wildcat was drilled to 7104 feet in dry Bend, topped at 6431 feet.

☆ East Texas

Sub-Clarksville Production Assured for Woodbine Field

Oil production from Sub-Clarksville sand assured for new Woodbine field in Wood County; Cherokee County deep prospect encounters additional gas showings; Smackover lime believed reached by Fairfield test.

Wood County: Sun Oil Company's Clanton 1, Allen Davey Survey and 1500 feet southwest of the Woodbine discovery for the Normal-Paul field, recovered 180 feet of 29-30-gravity oil when tester was used in oil-saturated Sub-Clarksville sand at 4796-4813 feet. This showing is adequate to assure a commercial completion, but the company was drilling below 5210 feet to explore the Woodbine before setting pipe. The discovery missed the Sub-Clarksville pay due to cutting a fault at 5095 feet. There is a possibility this pool will be connected with the Merigale field. A Sub-Clarksville producing area to the southwest.

Cherokee County: Standard Oil Company of Texas' New Birmingham 1, G. E. Looney Survey and 10 miles southeast of the Boggy Creek field, recovered 260 feet of gas-cut mud when tester was used in the Rodessa at 8985-9088 feet, and a new test was pending at 9136 feet. This wildcat showed high-pressure gas production in the Bacon at 8646-62 feet and will continue to the Travis Peak before setting pipe.

Freestone County: The Texas Company's White 1, west outpost for the Fairfield gas area, was drilling shale and anydrite at 12,080 feet. Top of the Smackover was tentatively called at 12,015 feet with elevation of 407 feet, but the underlying formation failed to show dolomite or lime.

Houston County: John Ivy and W. T. Moran's Murray 3, 4 miles southwest of Creek, was coring lime at 9255 feet in expectation of the Edwards. The Georgetown was entered at 8890 feet, and Mainstreet at 8960 feet.

Leon County: Daniel Oil Company's Cox 1, John Stritchfield Survey and prospective Woodbine oil producer, was preparing to perforate after cementing 5½-inch pipe on bottom at 7444 feet. No sand of any consequence was logged in the Woodbine series, but the well flowed a small amount of oil while awaiting casing. United North & South Development Company's Ogden 1, W. Martin Survey, developed casing leak after perforating opposite Woodbine at 6887-7337 feet, and will squeeze with cement. This wildcat was drilled to 8111 feet in Edwards, and pipe was cemented at 7396 feet.

Smith County: Humble Oil & Refining Company's Pool 2, 1740 feet southwest of its Mount Sylvan field discovery, was abandoned at 7590 feet. The company's Clark 1, northwest outpost and also a failure in the Paluxy, was drilling at 7490 feet to check the Glen Rose marker, but may continue to the Travis Peak in view of its high structural position.

THE OIL MAN'S CALENDAR

DEC. 3 -4	Petroleum Electric Power Association, Annual Conference, Tulsa, Mayo Hotel.
4	New Mexico Oil & Gas Association, Annual Meeting, Artesia.
9-11	Interstate Oil Compact Commission, Quarterly Meet, Dallas, Adolphus Hotel.
16-18	Annual Advalorem Tax Forum, Mid-Continent Oil & Gas Association, San Antonio, Plaza Hotel.

Nomads Chapter monthly meetings: LOS ANGELES, second Wednesday, Mayfair Hotel. Houston, second Monday, Ye Olde College Inn. NEW YORK, first Monday, Louis Sherry's. TULSA, third Wednesday, Hotel Tulsa. DALLAS, date not yet fixed.

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☆ East Texas Border

Waskom-Jonesville Flush Oil Area Has First Dry Hole

First dry hole noted in Waskom-Jonesville flush oil area; good oil show in south offset to same area's Cargill discovery.

Harrison County: Arkansas-Louisiana Gas Company's Howell 1, northeast offset to the Cargill discovery on the west flank of the Waskom gas field, was abandoned at 6210 feet, making the first dry hole for the flush oil area south of Jonesville. Howell 1 is about 800 feet northeast of the discovery.

C. M. Beckett, T. P. Smith and Atlas Oil & Refining Company's Minerva Cooper 1, south offset of the Cargill 1 flush oil discovery, was running production string after taking electrical log and getting good oil show on drill-stem test. Pay was topped at 5925 feet, and operator drilled on to 5935 feet, where on a 9-minute drill-stem test a quantity of high-gravity oil was reported to have been recovered, with pressure building up 40 pounds when packer slipped. A gas show was reported higher up in the Pettit. A dual completion attempt is expected soon.

"Cost-of-Living" Bonuses Planned by Several Majors

A wage adjustment, styled a "cost-of-living" bonus, for employes in the oil industry has been announced by several oil companies.

A wage increase covering a one-year period has been announced by H. F. Sinclair, representing the Sinclair companies, and O. A. Knight, president of the Oil Workers International Union (CIO). The initial monthly cost of living adjustment for Sinclair employes is to be $31.20. It is based on the Bureau of Labor Statistics national cost of living index for the nine months ended September 30 and is equivalent to 18 cents per hour, computed on the employer's estimated average rate of a 40-hour week. Further adjustments are provided in the agreement based on quarterly examination of government cost of living figures.

Stanolind Plan

Employes of Stanolind Oil & Gas Company will be paid a cost-of-living bonus, covering the period to January 15, 1947. Each of two installments will be a sum equal to 10 percent of the employe's monthly earnings, with a maximum of $50. Approximately 5500 workers will get the bonus.

A similar bonus will be paid employes of Continental Oil Company and Humble Oil & Refining Company, while a bonus of one week's pay will be paid most employes of Standard Oil Company of California and its wholly-owned subsidiaries.

On December 2, Shell Oil Company will give a special bonus equal to one week's basic salary or wage to all regular, full-time employes, except officers, who were in the company's employ November 16.

Gulf Bonus

A bonus amounting to one week's regular base pay, in the case of hourly employes and one-fourth of one month's regular base salary in the case of salaried employes, but not exceeding $100 to any employe, will be paid in early December by Gulf Oil Corporation and Gulf Refining Company.

Gulf's bonus will be paid to all its employes in the United States not employed on temporary work who were on the payrolls November 1, 1946. Excepted are directors, officers and employes included within a regular bargaining unit represented by a bargaining agency.

Sun Oil Company has authorized a payment equivalent to one week's basic compensation, the bonus covering the period from October 16 to December 31, inclusive, and payable during the week of December 16.

Standard of Indiana, Stanolind Officials Inspect Properties

Top executives of Standard Oil Company (Indiana) and its subsidiary companies—Stanolind Oil & Gas Company and Stanolind Pipe Line Company—last week inspected subsidiary properties in Oklahoma, Texas and Louisiana.

In the party were the following Standard of Indiana executives: Dr. Robert E. Wilson, chairman of the board; A. W. Peake, president; M. G. Paulus, vice president in charge of manufacturing; Harry F. Glair, general manager, manufacturing; Roy F. McConnell, vice president in charge of sales; H. E. Hanson, general manager, sales; L. C. Welch, general manager, lubricating and sales technical departments; Bruce K. Brown, vice president in charge of development; Buell F. Jones, vice president and general counsel; F. O. Prior, vice president in charge of production; R. O. Dietler, general manager, crude purchasing department; and R. J. Lindquist, financial vice president.

Stanolind Oil & Gas Company officials included: E. F. Bullard, president; A. L. Solliday, vice president in charge of operations; G. W. Clarke, manager, exploration department; C. S. Sanders, manager, producing department; J. E. Rouse, manager manufacturing department.

Stanolind Pipe Line Company was represented by Bruce Clardy, president.

Nomads Foreign Visitors

The Los Angeles Chapter of Nomads entertained international guests at the November meeting as follows: George W. Akers, National Mining Corporation, Ltd., Trinidad, B.W.I.; N. J. Alleman, E. R. Kelly and Kuhn Calvert of Attock Oil Company, Ltd., India; B. L. Coker, Danish-American Exploration Company, Denmark; T. A. Conner, Harry D. Huskey, R. H. Conner and Fred C. Lay of Iraq Petroleum Company, Ltd., Iraq; Phil C. McConnell, Arabian American Oil Company, Saudi Arabia; Warren L. Ellison, The Texas Company, Colombia; Robert T. Harcus, Byron Jackson Company; S. J. Liu, H. S. Yao and C. K. Suey, Chinese Petroleum Corporation; Walter L. Little, Tropical Oil Company, Colombia; J. O. Lederman and G. Salvy, SNPLM, France; C. H. Majors, Danish-American Exploration Company, Denmark; John E. Sligh, C. H. Strickland, C. M. Williams, Orlan G. Webb and Jack Walsh, all of Iraq Petroleum Company, Ltd., Iraq, and Spence T. Taylor, Socony-Vacuum Oil Company, Venezuela.

☆ South Central Texas

Southwest Flank Production Defined by Fashing Project

Fashing southwest flank production defined; wildcat southwest of Rossville makes production tests; Rock Springs wildcat at 4800 feet; Sabinal test shut down.

Atascosa County: Production on the southwest flank of Fashing (Wiegang) field has been defined by H. R. Smith et al's Tartt et al 4. This test has been abandoned at total depth of 3905 feet after finding no shows. Location is 933 feet south-southwest of Tartt 2 in James Wilkinson Survey 144, A-882.

Harris S. Stahl's Suzanna Pratt 1, wildcat 1½ miles southwest of Rossville, is making production tests after setting 5½-inch casing to 2407 feet. A drill-stem test at 2370-2407 feet recovered 80 feet of oil- and gas-cut mud, tool being open 15 minutes. After casing was run it was perforated at 2373-2405 feet and the well swabbed in showing water intrusion. These perforations were squeezed in an attempt to shut off the water and casing was to be reperforated at approximately the same interval.

Edwards County: Ray E. Pool's J. S. Peterson 1, wildcat 20 miles north of Rock Springs, is at 4800 feet. Drill-stem tests at 4360-4733 and 4760-4800 feet were dry, but both recovered fluorescent mud. Top of Ellenberger was picked up at 4425 feet.

Uvalde County: J. A. Green's Kennedy-Nunley 1, wildcat 7 miles south of Sabinal, has shut down to lay water line.

Correction

A recent letter from a subscriber points out an inaccurate statement made in a story captioned "Problems of Drilling the Continental Shelf," which appeared in the October 28 issue, page 25. The statement was, "Offshore drilling—in relatively shallow water—was first tried in 1937 . . ."

Offshore drilling in California was carried out successfully as early as 1929 in the Elwood field, Santa Barbara County.

☆ Southwest Texas

Duval County's Agua Prieta Wildcat Below 12,525 Feet

Deep Agua Prieta wildcat below 12,525 feet; Patel outpost shut in after being completed as gasser; Sun field outpost tests oil; new well completed in Holland field.

Duval County: Taylor Refining Company's E. A. Parr 1-G, wildcat 1½ miles northeast of Agua Prieta field, is drilling below 12,525 feet. This deep test tried to blow out at 9200 feet from a sand topped at 9192 feet. It is 330 feet from the north line and 1100 feet from the west line of SA&MG Survey 6.

Jim Hogg County: Newman Brothers Drilling Company & F. Callery et al's J. V. Pena 1, outposts a mile southeast of the Patel field discovery and ½-mile southeast of Callery's Pena 1 gas well, has been completed as a gasser. Completion was from perforations at 1578-83 feet and the well was shut in with no gauge taken. Total depth is 2977 feet with 5½-inch casing set to 1625 feet.

Starr County: Sun Oil Company's

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C. M, Hall 1-A, outpost 2/3-miles south of Sun field, is reported to have tested a little oil from perforations in the 4700-foot sand. This well was drilled to 10,542 feet before plugging back inside the 7⅝-inch casing, previously set to 6038 feet, for production tests. It is 1320 feet from the north and east lines of CCSD-&RGNG Survey 271.

W. L. Goldston's R. C. Roos Jr. et al 5, at Holland (formerly Cortez) field, has been completed as an oil well using gas lift. On potential the well flowed 52.44 barrels of 23-gravity oil daily on open flow with gas-oil ratio 310/1. Total depth is 3335 feet and casing is perforated for completion at 2960-64 feet. This test is 950 feet southeast of the Roos & Bennett 2 oil well.

☆ Lower Texas Coast

Wildcat Near Lucas Gas Field Being Completed as Oil Well

Wildcat northeast of Lucas field being completed as oiler; new deep pay zone discovered on south flank of La Gloria; west outpost at Tijerina-Canales completed in new pay; second producer from new pay at Midway completed.

Live Oak County: Henshaw Brothers and E. H. Smith's H. N. Schwartz et al 1, wildcat 2 miles northeast of Lucas gas field, is flowing about 30 barrels of oil daily through 7/64-inch choke with the flow gradually improving. Production is from perforations at 4017-19 feet and total depth is 4495 feet with 5½-inch casing set to 4100 feet.

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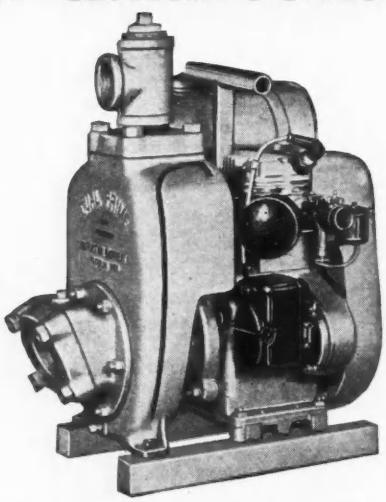

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Brooks County: Argo Oil Corporation's B. B. Riley 3-A, has discovered a new deeper pay zone on the south flank of La Gloria field. From perforations at 6970-71 feet and on potential the flow was gauged at 304.67 barrels of 43.4-gravity oil daily through ⅛-inch choke with 1825 pounds tubing pressure and 2075 pounds casing pressure. Total depth is 7406 feet and the new pay was topped at 6961 feet. This well failed to produce commercially from the regular oil pay zones in the field and was deepened to the new zone.

Jim Wells County: The Texas Company's H. C. de Tijerina 37, west outpost at Tijerina-Canales field, has been completed in a new shallow pay zone. From perforations at 6990-95 feet, flow was gauged at 54.15 barrels of 42.5-gravity crude daily with no water through 5/32-inch choke. Gas-oil ratio was 752/1 and tubing pressure 175 pounds. Salt water was recovered in a test of the regular pay sand at 7169-79 feet. This well is 3215 feet west of the Tijerina 9, nearest producer.

San Patricio County: George K. Taggart's Coggin 1, Midway field, has been completed as the second producer from the new 5680-foot pay zone. It flowed 123.75 barrels of 41-gravity oil daily through 7/64-inch choke. Gas-oil ratio was 550/1, tubing pressure 900 pounds, and casing pressure 1100 pounds. Total depth is 5682 feet with 5½-inch casing set on bottom and perforated for completion at 5678½-80½ feet. This new pay zone was discovered by F. M. Boykin's Hutto 3.

Oklahoma Hearing

Oklahoma State Corporation Commission has set November 26 as the date for considering market demands and fixing the state and pool allowables for the months of December and January. Hearing is scheduled for 11 a.m. in Oklahoma City.

☆ Upper Texas Coast

Third Directional Hole Being Drilled in Willow Slough Test

Third directional hole started at Sun's Willow Slough wildcat; wildcat off west flank of Esperson nearing top of Yegua; Pierce Junction has new producer; Shell completes well on northeast flank of Sheridan field.

Chambers County: The third directional hole is being started in Sun Oil Company's Hebert & Broussard 1, wildcat a mile north of production in Willow Slough field. First hole was dug to 8497 feet with no shows and was plugged back and whipstocked at 5948 feet for directional hole that was drilled to 8450 feet, also with no shows. This hole was plugged and whipstocked at 6125 feet and a second directional hole drilled to 8450 feet where log and sidewall samples were taken. Hole has now been plugged to 5400 feet for third directional try.

Harris County: Eli Marks' A. B. Cohn Estate 1, wildcat just off the west flank of Esperson dome production, is below 7986 feet, nearing the top of the Yegua. No favorable shows have been encountered. Production at Esperson field is from the Frio and Yegua formations. Projected depth of the wildcat is to the 9200-9500 foot levels. It is 1000 feet southwest of The Atlantic Refining

Company's Cohn Estate 1 which was drilled to total depth of 9502 feet with favorable shows below 9000 feet.

A new producer on the northeast flank of Pierce Junction dome is Production Service Company's Ellen White Fitzsimmons 2. On potential the well flowed 115 barrels of 22.7-gravity oil daily through 7/64-inch choke with 600 pounds flowing pressure on tubing. Total depth is 4242 feet with casing perforated for completion at 3641-64 feet.

Colorado County: Shell Oil Company Inc.'s J. W. Hopkins 1 is a new gas-condensate producer at Sheridan field. On potential the well flowed 148.7 barrels of condensate daily along with 2,551,000 cubic feet of gas through ¼-inch choke. This well is 4000 feet north-northeast of Grubb & Hawkins' Powers 1. Total depth is 10,451 feet and perforations are at 9320-78 feet.

☆ South Louisiana

Outpost Near Rapides Parish Strike Cores Saturated Sand

Outpost east of Tuscaloosa sand strike in Rapides Parish cores saturated sand; Bayou Blue wildcat abandoned; Humble's Lake Salvador test plugged.

Rapides Parish: Union Producing Company and M. H. Marr's John Tyler 1, outpost at Big Island field ½ mile east of the Belgrad 1, recent Tuscaloosa sand discovery, has cored saturated sand. Cores from 9682-92 feet in the Tuscaloosa had good shows of oil. A drill-stem test was attempted at 9680-92 feet but packer gave way and bottom joint of pipe collapsed. When tool was pulled a recovery of 16 stands of gas-cut mud and some oil was made. Another drill-stem test was to be made at this level. One other test has been made in the hole. At 9297-9305 feet a drill-stem test was attempted but the seat slipped, recovering 24 stands of salt water, mud and some gas.

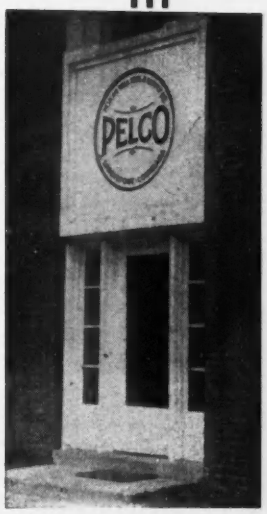
Plaquemines Parish: Additional information on The California Company's oil discovery in the new Alliance field has been released. The new well is Louisiana Citrus Lands 1, 1400 feet south of Brady 4, Unit 4, gas and condensate discovery for the field. Total depth is 9800 feet with 7-inch pipe set on bottom and perforated for completion at 9740-45 feet where the well flowed 207 barrels of 38.7-gravity oil daily through ¼-inch and ⅛-inch chokes. Pressure at the top was 1700 pounds and gas-oil ratio 800/1. Tubing was run for production test but sanded up. Tubing has been pulled for a clean-out, after which another production test will be attempted.

Iberville Parish: T. G. Markley's Greif Brothers Cooperage Company 1, wildcat in the Bayou Blue field, has been abandoned at 7299 feet after encountering no commercial shows. This dry hole is in the southwest corner of 75-9s-10e.

Jefferson Parish: Humble Oil & Refining Company's State 3, Lease 642, wildcat in Lake Salvador, has been plugged at 11,656 feet. Tests were made at 11,372-385 feet with a show of salt water and a very slight show of oil; at 8570-76 feet recovering salt water and mud; and at the 7817 foot level where salt water and mud was recovered.

It may be Jujitsu!

Don't rejoice too much over the demise of the OPA. Bureaucracy is an octopus, with no holds barred. It may be turning loose with one tentacle for a better grip elsewhere. Many men well informed on sugar think the shortage has been government created. Certainly it has been government manipulated. According to Tide, Julian M. Snyder sent cigarettes to an old friend in Holland because of fantastic black market prices. The grateful Dutchman dispatched six pounds of sugar to Snyder! And where does Holland get sugar? Right!



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☆ North Louisiana

Haynesville Field Has Second Smackover Lime Producer

Second Smackover lime producer in Haynesville field, Claiborne Parish, completed.

Claiborne Parish: The Ohio Oil Company's DeLoach 1, 22-23-6, was completed as the second oil producer in the Haynesville field from the Smackover lime, flowing 99 barrels of 57.9-gravity oil through 12/64-inch choke in a 9-hour run, an average of 11 barrels per hour. The well also showed for 902,183 cubic feet of gas for the same period. Tubing pressure was reported at 3900 pounds, and gas-oil ratio 997/1. A better flow is expected. The well is an offset to Ohio's Bond-Beene 1, brought in last May, with initial production 730 barrels, and bottomed at 10,739 feet. It was perforated with 792 shots from 10,190-388 feet.

Webster Parish: C. H. Murphy, Jr.'s Gray 1, 26-21-10, Cotton Valley field, was completed for 300 barrels of 50-gravity oil from the Travis Peak. It is bottomed at 3602 feet, and was perforated from 5722-28 feet. With completion of Gray 1, immediate removal of the equipment to an offset location was begun by Murphy and McMillan Petroleum Corporation, to drill Connell 1, 200 feet south of the corner of SW NE 26-21-10.

Jackson Parish: Shell Oil Company's Tremont Lumber Company 3, 21-15-1, was reported in shale below 12,355 feet, having reached the status of being one of the deepest tests in North Louisiana.

☆ Arkansas

Buckner Smackover Field Test Completed from Shallow Pay

Shallow pay completion finaled in Buckner Smackover lime field; Village extension and wildcat south of Stephens indicate new production.

Columbia County: J. R. Hayden's Dean 1, 15-16s-22w, is the first well in the Buckner field to complete from a shallow pay. The well is pumping 7 barrels per hour from perforations at 4845-52 feet. The well was reworked after being depleted in the Smackover lime, usual pay of the field.

McAlester Fuel Oil Company's wildcat Alexander A-1, NE SE 17-17-19, 1 mile east of Village field, was having pump unit installed, having been completed as a Travis Peak producer from 4333-58 feet.

Atlas Oil & Refining Company's R. A. Wynn 1, wildcat, in SWc 8-15-19, 4 miles south of Stephens, reputedly has been taken over by McAlester Fuel Oil Company. The test is now installing tanks and pumping units. The well is estimated good for 25 to 75 barrels daily, and a new oil pool seems to have been discovered.

Mid-Continent Office of Gas Association Closed

The Mid-Continent office of the Independent Natural Gas Association of America at Oklahoma City will close December 1, and its activities transferred to the Washington, D. C., office.

The original purpose of the office was to spearhead association membership drives. The present membership is 1600, and solicitation work is functioning so well that the directors felt that the work should now be consolidated with the Washington office activities.

Oil Group Gives Luncheon

Western Oil and Gas Association gave a luncheon November 20 in San Francisco for the American Association of Motor Vehicle Administrators. Among those attending were J. L. Hanna, vice president, Standard Oil Company of California; L. F. Bayer, vice president, Tide Water Associated Oil Company; E. A. Waite, director of public relations, Standard of California; E. A. Cunningham, director of public relations, Shell Oil Company; and Don Gilman, executive vice president, Western Oil and Gas Association.

☆ Mississippi

Tests Being Made in Well At Record Depth Levels

Forrest County wildcat continues to test at record depth levels; Gulf prepares completion of two wells at Eucutta.

Forrest County: Superior Oil Company's Cassie Bradford 1, C SW SW NW 1-3n-13w, deep wildcat, continues to test below the 14,800-foot level with no information given out. Rumors indicate a good blow on one of the tests at this low level. If the well should be completed successfully it would be the world's deepest producer.

A new piercement-type salt dome has also been located with the drilling of Sippialla's J. E. Wilson 1, NE SW 25-5n-13w, sulphur test. The dome is located about 3 miles northeast of Hattiesburg, with salt being topped at 1739 feet. The well was abandoned last week at 1802 feet.

Issaquena County: C. H. Osmond's Anderson Tully Lumber Company 1, C NE SW 9-17n-3e Tuscaloosa test, is drilling below 7200 feet with no shows. C. E. Murphy, Jr. and Sun Oil Company's J. Atkinson 1, SE SW 4-9n-8w, is running core tests below 3850 feet with nothing encouraging.

Jefferson County: The California Company's W. G. Greer 1, SEc SW 10-9n-4e, wildcat, is running core tests in the Wilcox zone below 4556 feet. Drill-stem test of the same horizon at 3353-74 feet yielded salt water and mud with no shows. Bottom hole pressure was 1300 pounds. Humble Oil & Refining Company's J. F. Gordon B-1, 44-9n-1w, is drilling below 10,770 feet in shale and lime with no shows.

Lincoln County: Parker Drilling Company's J. B Arrington 1, SE NE 29-8n-5e, wildcat, is drilling below 8800 feet. Production, if any, should be established within the next 1300 feet. Humble Oil & Refining Company's Lincoln County Board of Supervisors 1, C NE NE 16-8n-5e, wildcat, is drilling below 9823 feet with no shows. The California Company's T. H. Smith 1, 3-7n-7e, in the Brookhaven field, is rigging up pump after establishing production in the Massive sand zone through 132 shots

at 10,500-522 feet. The well had heavy intakes of salt water on initial test and further work will have to be done.

Wayne County: Gulf is preparing to complete 2 good oilers in the Eucutta field. Its T. J. Clark 1, 34-10n-9w, is testing on pump after swabbing 30 barrels per day from the Eutaw section. The Lillie M. Johnston 4, C NE SE SW 34-10n-9w, is preparing to take on pump after successful swabbing.

Alabama

The Carter Oil Company's Rex-Alman 2, C SW NE NE 4-10n-3w, in the East Gilbertown field of Choctaw County, flowed 50 barrels of 18.5-gravity oil in 20 hours, open, the largest flow to date in the field. The Eutaw zone was perforated at 3323-55 feet with 192 shots to establish production.

Florida

In Monroe County, Gulf Refining Company's State 1, 2-67s-29e, has reached 13,284 feet and is changing over to smaller drill pipe. Driller is still working in anhydrite section streaked with lime. Gulf's State 1, Lease 374, 15-67s-27e, is drilling below 3196 feet in Dolomite. In Osceola County, Humble Oil & Refining Company's Hayman 1, C SW SE 12-31s-33e, wildcat, is running core tests below 7914 feet in dolomite. No shows have been reported.

Fifth North Carolina Test For 1946 in Merrimon Area

Carolina Petroleum Company is preparing to spud the fifth wildcat test to be drilled this year on its Merrimon block, in eastern North Carolina. All previous tests have been abandoned.

The fourth test drilled on the block was the H. B. Salter 1, located 18 miles north of Beaufort, abandoned in October at 3962 feet in granite. This was the first test drilled in North Carolina to log sands worthy of a drill-stem test. Drill-stem tests were made on 4 sand horizons with a small amount of oily mud being recovered from one of the sands. Three of the sands were logged in the Tuscaloosa with the upper sand at 1900 feet in the Black Creek, equivalent to the Austin Chalk.

The fifth test to be drilled is Wallace 1, about 2½ miles east of the Salter 1 dry hole. The Carolina Company was organized by R. A. Stamey, Houston geologist.

☆ Ohio

Miley Reports Extension As Does Mayfield Newburg

Miley extended northeast; another gas completion in Salt Creek; second well in northwest Brush Creek; Mayfield's Newburg extended south; Jefferson Township well is failure.

Holmes County: The Ohio Fuel Gas Company extended the Miley pool ½-mile northeast at Spring-Hudson Consolidation 1, NE SW 32 Ripley Township. The lower Clinton, 3142-56 feet gauged 625,000 cubic feet natural and 1,150,000 cubic feet of gas after shot.

Muskingum County: Bartley's Madge Warne 3, NE SE 33, Salt Creek Township, made 3 million cubic feet gas in the Clinton which will be marketed before drilling on to the Medina. The sand, topped at 4168 feet was drilled to 4194 feet. In the northwest part of Brush Creek Township, the Ohio Fuel Gas Company's C. A. Johnson 1, NW NW 14, came in at 800,000 cubic feet natural. The completion is the first offset to the discovery on Buchanan.

Cuyahoga County: Benedum-Trees drilled on to the Newburg after stopping at the Oriskany horizon with 2 gas wells on Mayfair Gardens, Lot 20, Mayfield Township. Newburg was topped at 2815 feet, was drilled to 2856 feet and made 950,000 cubic feet natural.

Jackson County: The second recent attempt to extend the Lancaster-Jackson field through Jefferson Township ended in failure. Ohio Fuel Gas' Marta Brady 1, SW SE 23, logged the Clinton at 2746-64 feet with no shows. The company has moved the tools 1½ miles southwest for another test.

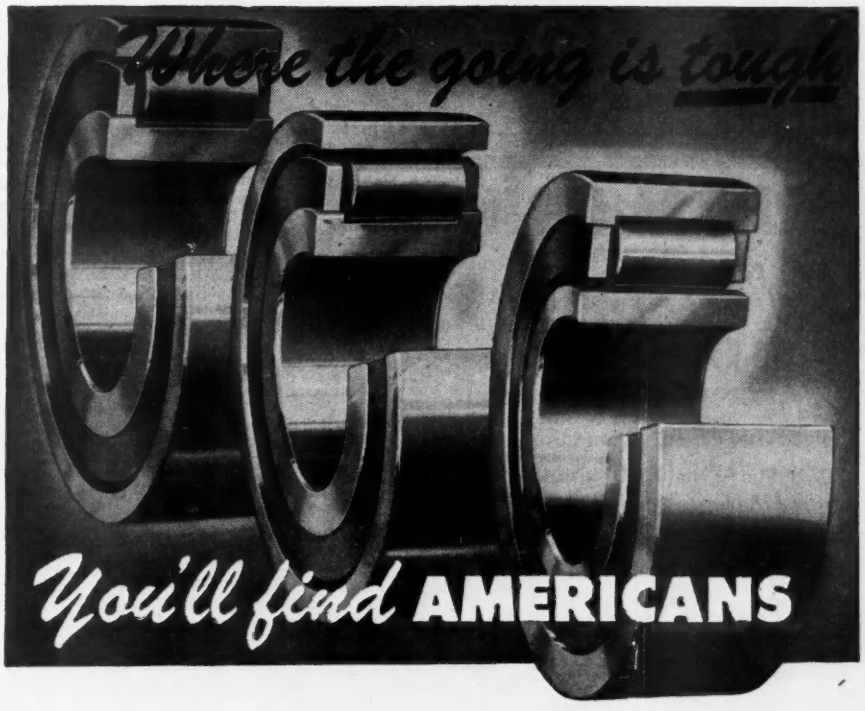
☆ Rocky Mountain Area

Fremont County, Wyoming, Prospect to Be Given Test

General Petroleum conditions hole for test of Fremont County, Wyoming, wildcat; shutoff completed in Stanolind's Park County Madison strike; Elks Spring, Colorado, Weber discovery given shot.

Wyoming

General Petroleum Corporation is conditioning hole at Antelope Unit wildcat 45-25-G, NE NE SW 25-27n-94w, Fremont County, to make drill-stem test in the Frontier formation between 8790-9078 feet. Cores in this section had



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shows of gas and distillate but cavings have prevented test of the zone. This well is 10 miles southwest of the Crooks Gap field, which now has 6 wells producing 1500 barrels of oil per day from the Lakota horizon at approximately 4500 feet. The Frontier formation at Crooks Gap has shown oil on test but no wells produce from this horizon. The Antelope structure test is 8 miles northwest of a wildcat location recently released by The Carter Oil Company on its Great Divide unit at Government 1, C NE NE 13-26n-93w, Sweetwater County. Operations are expected to start on this latter wildcat soon.

At Steamboat Butte, British American Oil Producing Company has run liner in its Madison test, Tribal 6-E, NW NE NW 5-3n-1w (WRM), and is perforating and testing Madison and Amsden formations. Madison, topped at 7368 feet, carried water and when perforated between 7378-7408 feet and acidized made additional water. Amsden, topped at 7233 feet, showed gas and some oil on drill-stem test, and this zone will be tested more thoroughly. This structure produces from Tensleep and Sundance formations.

Park County: At Elk Basin, Stanolind Oil & Gas Company has succeeded in squeezing leaks from around the 7-inch casing at its important Madison lime discovery, 38-M, NE SE NE 24-58n-100w. Operator has been attempting this shutoff to test the lower Madison section. Oil was discovered in Madison, topped at 4350 feet, 3 months ago, and the well was drilled to 5013 feet, still in Madison formation, with no water shown on drill-stem test. Since the lower section of the formation was extremely hard and tight, Stanolind ran a 5-inch liner to 4680 feet, through the most promising section, and started production tests. The well flowed at the rate of approximately 200 barrels of 30-gravity oil per day natural before the leak was discovered. Recently the well was swabbed at the rate of 75 barrels of oil per day after shutoff was completed. Inasmuch as the best zone is cased off, this gauge is not indicative of Madison potential.

Colorado

Continental Oil Company has shot its Elk Springs Weber discovery well with 77 quarts of nitroglycerine and is now cleaning out the gravel tamp at 6050 feet. The well is Smith 1, NW SE SW 30-5n-98w, Moffat County, and Weber was topped at 6087 feet. The well went to 6231 feet but made water on drill-stem tests below 6145 feet. A plug was set at 6140 feet, effecting water shutoff, but the well swabbed only 39 barrels of oil in 15 hours for initial test. Because of the Weber condition it is expected the shot will increase production considerably. This well is of interest because of its proximity to the Rangely field, which is producing 26,000 barrels of crude per day from the Weber formation.

Montana

The Texas Company has shut down operations for the winter on the Utopia field deep test, Nick Lass 2, NW NE SW 14-33n-4e, Liberty County. The well was drilled to 4593 feet and plugged back to 3375 feet in the Jefferson formation, which had encouraging shows of oil and gas.

☆ Canada

Best Oil Well Completed on Western Canadian Plains

South Princess Syndicate 3, lsd 12 8-19-11w4, has become the best oil well completed on the Western Canadian Plains as a result of light acidization of the Madison limestone porous horizon. After flowing for several days through 9/64-inch choke at 60 to 70 barrels daily, the well was treated with 1000 gallons of acid—250 gallons wash, and 750 gallons penetrating. After clearing under its own power, and making 107 barrels in 13.5 hours, the well made a 24-hour test run. In this period, producing under heavy back pressure through 10/64-inch choke, the well made 180 barrels of clean 27.2-gravity crude plus 165,000 cubic feet of gas, for a gas-oil ratio of 910 cubic feet per barrel. At the start of the test, casing pressure was 500 pounds, tubing pressure 550 pounds. At the end of the test casing pressure had risen to 1150 pounds, tubing to 790 pounds. During the final 8 hours of the test, flow averaged 11 barrels hourly—a rate of 264 barrels daily. Flow was completely free of water. After this run, well was shut in for closed pressure test. It will then go on steady production.

The well is the first in a 6-mile virgin stretch between 2 previous Madison lime completions in the South Princess area of the Southern Alberta Plains. Both earlier completions are small flowing oil wells, but presence of water soon after completion decided operators against full acidization to determine productive potentials. It is now believed that the water is coming from the Devonian due to faulty cement (both earlier wells deepened to Devonian after getting the Madison oil zone). Both will be reworked in an effort to shut off water and fully determine Madison possibilities. The new success, completed 5½ feet in the Madison at 3326 feet, reached the lime 30 feet lower than 1 and 16 feet lower than the other earlier completion, further bolstering belief that the water is from a zone other than the Madison.

Standard Oil Company of California and the several independents who joined in the South Princess Syndicate are now expected to embark on a fair-sized followup development program in the vicinity of the new success.

Imperial Oil Ltd. has stepped into another large virgin section of the Central Western Alberta Plains, taking up a 575,000-acre Crown oil and gas reservation from the Alberta government in the Chip Lake-Whitecourt area northwest of the city of Edmonton. The new reserve takes in about 25 townships.

Heads Geologists

C. T. Jones, Rocky Mountain exploration manager for Stanolind Oil & Gas Company, has been elected president of the Wyoming Geological Association. Also elected were R. W. McCanne, Ohio Oil Company, first vice president; T. C. Hiestand, Cities Service Oil Company, second vice president, and W. A. Thompson, The Texas Company, secretary-treasurer. The association discussed plans for a field trip through the Big Horn Basin of Wyoming next year in connection with the University of Wyoming and the Yellowstone-Big Horn Research Association.

ARKANSAS WILDCAT

Ouachita County—Failure: Atlas O&R Co.'s Green 1, c se sw 4-14s-19w, 3 mi ne Benedum-Trees fld, Nacatoch 1308, Tokio 2212, James ll 2350, Travis Peak 2605, abnd 11-9-46 at 4015.

CALIFORNIA WILDCATS

Kern County—Failure: Tide Water's M. & S. 113, 29-28s-28e, Kern River area, abnd 11-10-46 at 6152.

Los Angeles County—Failures: Morton & Sons' Wm. Rowland Estate 302, 16-2s-10w, Turnbull Canyon area, abnd 11-12-46 at 7522.

Standard Oil Co.'s Op's Six Companies **Fee 2,** 2-3s-15w, El Segundo area, abnd 11-11-46 at 7075.

Orange County—Failure: M. R. M. Syndicate's Crew Community 1, 32-5s-10w, Huntington Beach area, abnd 11-9-46 at 9752.

Kern County—Oil Discovery: Western Gulf Oil Co.'s DiGiorgio 1, nw 10-31s-29e, flow 400 bbls 31-gr, 1.7% wtr, 22/64-in, perf 5935-6160 in fractured Schist, comp 11-15-46 at 6163.

Fresno County—Lanare Extension: Pacific Western Oil Co.'s Brix-Francis Community 1, 16-17s-18e, ½ mi nw prod, oil sd 6745, base 6770, flow 300 bbls 38.5 gr, 0.5% wtr, 12/64-in, comp 11-8-46 at 7150.

FLORIDA WILDCATS

Flagler County—Failure: Humble's Lake Crescent Farms Co. 1, c nw ne 8-11s-28e, abnd 11-14-46 at 1822.

Gulf County—Failure: Pure's Pick Hollinger 1, 12-9s-11w, abnd 11-13-46 at 5655.

ILLINOIS WILDCATS

Clay County—Failure: Paul Doran's Guerrettaz 1, nw nw se 315n-5e, abnd 2754.

Jefferson County—Failure: Collins Brothers et al's White 1, sw nw se 26-1s-2e, abnd 2378.

Madison County — Failure: Paul Doran's Mindrup 1, ne ne ne 13-5n-6w, abnd 1959.

Marion County—Failures: W. R. Britton's Bundy 1, ne nw ne 26-2n-1e, abnd 2030.

T. Blake Dirickson's Jackson 1, nw nw ne 24-3n-2e, abnd 2442.

George McDevitt's Zollar 1, sw sw sw 30-3n-2e, abnd 2046.

Richland County—Failures: Sam Malis et al's Thaste 1, w2 se se 4-2n-10e, abnd 3347.

Pete Supplin's Crews 1, se ne sw 10-3n-11w, abnd 1908.

Shelby County—Failure: E. P. Jarvis' Stewardson 1, sw ne ne 16-11n-4e, abnd 1944.

Wabash County—Oil Discoveries: Hayes & Wolfe's Meyer 1, sw sw nw 8-1s-13w, flow 140 bbls fr Benson sd 2560-72, td 2578.

Sam Malis' Fite 1, ne ne nw 7-1n-13w, flow 900 bbls fr McCloskey 2813-20, td 2824.

Wabash County—Failure: Hayes & Wolfe's Meyer-Groff 1, se sw sw 5-1s-13w, abnd 2823.

INDIANA WILDCATS

Gibson County—Failure: Carter Oil Co.'s Steckler 1, nw nw se 1-1s-12w, abnd 2475.

Sullivan County—Failure: J. A. and L. B. Van Horn's Sisters of St. Francis 1, c w½ w½ se 36-11n-9w, abnd 560.

KANSAS WILDCATS

Barton County—Failure: Sohio et al's Hertach 1, sw sw se 12-18s-11w, abnd 3385.

Butler County — Failure: Aylward Prod. Co. et al's Womack 1, 19-28s-6e, abnd 2720.

Cowley County—Failure: Earl Makefield's Oglibee 1-C, sw ne ne 7-32s-4e, abnd 2015.

Ellsworth County—Failure: Cities Service's Cook 1-B, ne ne sw 19-14s-10w, abnd 3177.

Gove County—Failure: Superior's Preifeit 1-H sw sw sw 32-13s-29w, abnd 4753.

McPherson County—Failure: E. H. Adair et al's Test 1, e n½ nw nw 3-18s-1w, abnd 2716.

Meade County—Failure: Helmerich & Payne et al's Adams 1, c sw nw 11-35s-29w, abnd 6250.

Norton County—Failure: Derby & Peel's Test 1, nec 8-1s-21w, abnd 3775.

Rooks County—Failure: Skelly's Gick 1, nw ne sw 30-10s-17w, abnd 3710.

Rush County — Failure: Darby & Bothwel's Thalheim 1, ne ne nw 10-19s-18w, abnd 3869.

Scott County—Failure: Atlantic et al's Mark 1-D, c se sw 7-20s-33w, abnd 4882.

Sumner County—Failure: Schneider & Cameron's Sheppard 1, sw se nw 1-32s-2e, abnd 2667.

KENTUCKY WILDCATS

Crittenden County—Failure: Reed & Pfunder's Lofton 1, 14-K-20, abnd 1525.

Daviess County—Failure: Sun's Wright 1, 14-O-28, abnd 2107.

Union County — Failure: George Engle's Mason 1, 24-O-19, abnd 2700.

NORTH LOUISIANA OUTPOST

Lincoln Parish — Hico-Knowles Extension: R. W. Williams' Cooper 1, fr swc sect 25 go 2640 n th 1310.5 e to lcn in 25-20n-4w, 1 mi nw prod, perf 360 shots 8287-8345 in Bodcaw sd, flow 113 bbls dist, 1,858,032 gas, ¼-in, gor 16,443/1, tp 3050 lbs, comp 11-8-46 at 8432.

SOUTH LOUISIANA WILDCATS

Iberville Parish—Failure: T. G. Markely's Greif Bros. Cooperage 1, 1650 e 330 n fr swc 75-9s-10e, 6000 sw Bayou Blue prod, abnd 11-13-46 at 7299.

Jefferson Parish—Failure: Humble's State-Lake Salvador 3 Lse 642, e 19,802 th n 4977 fr USCGS TT Station 62F lcn in Lake, abnd 11-14-46 at 11,656.

Plaquemines Parish—Failure: Texas Co.'s Delta Duck Club 17, 4065 s 333 w of nec 7-21s-20e, 1¾ mi s prod, abnd 11-9-46 at 11,098.

MISSISSIPPI WILDCATS

Forrest County—Failures: Sippiala Corp.'s L. Stapelton 2, nw 25-5n-13w, anhydrite 1235, abnd 10-30-46 at 1393.

Sippiala's J. E. Wilson 1, ne sw 25-5n-13w, anhydrite 1698, salt 1739, abnd 10-24-46 at 1802.

MONTANA WILDCATS

Golden Valley County—Failure: Monoco Oil's N.P.R.R. 1, c nw nw 19-7n-19e, Harlo Dome, Ellis 2896, Amsden 3097, Madison 4560, abnd 11-4-46 at 4941.

OHIO WILDCAT

Jackson County—Failure: Ohio Fuel Gas Co.'s Marta Brady 1, sw se 23, Jefferson Twp, abnd 11-13-46 at 2878.

OKLAHOMA WILDCATS

Comanche County—Failure: Griffin Barbre's Ehlman 1, se se se 6-1s-10w, abnd 2790.

Cotton County—Failures: S. W. Johnson's Schumpelt 1, nw nw ne 26-1s-14w, abnd 1394.

O. L. Ledgerwood's Pruitt 1, se se nw 33-2s-12w, abnd 2008.

Harper & Turner et al's McGee 1, se se ne 3-2s-13w, abnd 931.

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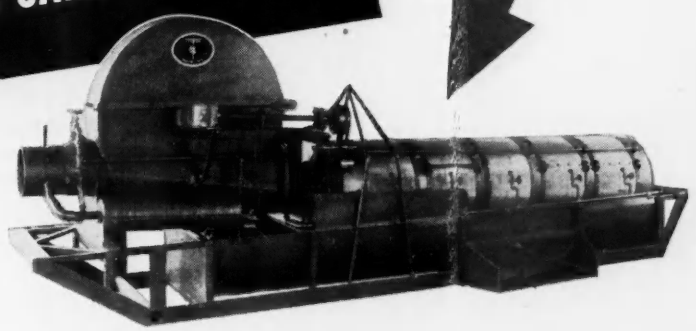

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■ **Geologists, Micropaleontologists, Petrographers, and Petroleum Engineers wanted for service with major oil company in South America. Salary dependent on qualifications. Applications may be made in person or by letter to: Gulf Oil Corporation, New York Production Division, 17 Battery Place, New York 4, N. Y., Room 1633.**

■ Geophysical Interpreter experienced in seismic computing and interpretation needed by oil company for interpretation of Seismograph work being done currently. Permanent location. Give age, education and experience in first letter. Our own employes in this field know of this advertisement. Box 96, c/o The Oil Weekly, Houston, Texas.

■ Young graduate Geologist to work in West Central Texas in geological and geophysical lines. Drafting, general surveying and subsurface knowledge required together with eagerness to learn. Earl Robert McFarland, 2825 S. 1st, Abilene, Texas.

SEISMOLOGIST

Seismologist wanted by major oil company operating in Gulf Coast and Mid-Continent. Position involves review interpretation of work done by various seismic contracting companies and requires familiarity with correlation, dip and continuous-profile computing techniques. Geological background desirable but not essential. Location in Houston, Texas. State in first letter education, age, experience, salary expected and date available. Our employees in this category know of this advertisement. Box 95, c/o The Oil Weekly, Houston, Texas.

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▪ Petroleum Engineer with Major Company for eleven years; superintendent of operations for five years; capable of assuming full responsibility for drilling and production program. Just returned from 28 month tour of overseas duty with Army Corps of Engineers and is seeking a responsible position with a drilling and production company. Can furnish best of references. Box 99, The Oil Weekly, Houston, Texas.

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E. P. Halliburton's Pendergroff 1, nw nw sw 1-4s-12w, abnd 2503.

Duncan & Hamilton's Postlewaite 1, nw ne sw 7-5s-12w, abnd 1696.

Garvin County—Failure: Sohio's Topton 1, nw se sw 21-3n-1e, abnd 3940.

Okfuskee County—Oil Discovery: Mid-Continent's Baker 1, se ne nw 31-12n-7e, pump 20 bbls fr Prue sand 2925-45, td 4361.

Seminole County — Oil Discovery: Sam Rhoades' Letka 1, ne ne ne 32-8n-7e, flow 105 bbls fr Cromwell 3278-94, td 3294.

Stephens County—Failure: Parker McCune's Callaway 1, ne ne ne 17-1n-8w, abnd 7340.

WEST TEXAS NEW PAY TEST

Andrews County—Block 12 Deep Failure: Phillips' University 1-O, se offset to 7300-ft Clear Fork prod. elev 307 anhy 1670, Yates 2850, Glorietta 5500, Clear Fork 5950, Tubb 6442, base Permian 8060, Woodford shale 8098, Devonian 8253, abnd 11-18-46 at 8600.

WEST CENTRAL TEXAS WILDCATS

Callahan County—Failure: Carl Hovgard-George Waite's Young 1, 1228 out of sec S.P. Ry 6, blk 8, elev 1899, abnd 1-8-46 at 1947.

Runnels County—Oil Discovery: Geochemical Surveys-W. R. Ransome's J. W. Harris 1-A, 695 snl 2230 wel of 184-ac tr and J. V. Cabrera sur 514, 8 mi ne prod, elev 1921, Palo Pinto 3380, Gardner (Strawn) 3900, Gray 4020, flowed 59 bbls 42-gr oil, gor 200/1, open tubing, shot 100 quarts nitro Gardner pay 3900-14, td 4085, pb 3927, comp 11-11-46.

Shackelford County—Oil Discovery: Roeser-Pendleton's W. I. Cook 1-B-90, 1594 snl 220 ewl sect 90, E. T. Ry. sur, 5880 e of prod, elev 1871, pump 90 bbls 38-gr oil, gor 558/1, sand 1311-28, comp 11-12-46.

NORTH TEXAS WILDCATS

Archer County—Failures: Harvey Drlg. Co.'s Abercrombie 1-I, 150 nsl 1200 wel blk 28, J. W. Harris sbdn, abnd 11-1-46 at 1550.

Harvey Drlg. Co.'s Abercrombie 1-J, 1100 wel 1200 nsl blk 23, J. W. Harris sbdn, abnd 11-5-46 at 1559.

Reno Oil Co.'s Conrady 1, 1325 out sec blk 79, Jefferson CSL sur, abnd 11-11-46 at 1202.

Reno Oil Co.'s Garvey 1, 1350 nsl 150 wel sect 1854, TE&L Co. sur, abnd 11-7-46 at 873.

Clay County—Failures: Gus Blakely et al's B. V. Engle 2, 1180 ewl 450 nsl of 200-ac tr, Orange CSL, abnd 11-9-46 at 321.

L. T. Burns et al's Graner 1, 1400 n of R. W. Tye sur, about 3267 w of lot 1, but in lot 7, Calhoun CSL, elev 972, abnd in Simpson 10-30-46 at 6445.

Cooke County—Oil Discovery: R. B. Hollandsworth Drlg. Co.'s H. E. King 1, 750 nsl 150 ewl of 253.6-ac tr, M. Langham sur, elev 973, pump 10 bbls sand 1005-10, comp 11-3-46 at 1010.

Jack County—Failure: Texas Canadian Oil Corp. (was L. T. Burns') Garrett 2, (OWDD) 450 wel 2296 nsl BBB&C sur, otd 4981, elev 1015, Bend 4818, Barnett 5470, Mississippi 5555, Ellenburger 5846, abnd 11-3-46 at 5933.

Wichita County—Failure: Frank Wood et al's Siber 1, 330 nsl 990 ewl blk 51, Red River Valley Lands, abnd 11-3-46 at 2856.

Wise County—Failure: J. Edwin McKee's Gasperson 1, 330 nsl 660 ewl sect 67, Van Zandt CSL sur, abnd 11-11-46 at 1170.

SOUTH CENTRAL TEXAS WILDCAT

Medina County—Failure: Chas. H. Wagener's A. Dock Griesenbeck 1, 160 fr sl 800 fr wl lot 14-A, blk 5, sur 1, Chicon Lake area, abnd 11-1-46 at 1169.

SOUTHWEST TEXAS WILDCATS

Duval County—Failures: Tom Graham et al's J. T. Dinn 1, 467 fr n&wl unit 1 (40 acs) or 1798 fr wl 467 fr nl sur 666, 1 mi n Dinn fld, abnd 11-8-46 at 6508.

Magnolia's E. V. Spence 1, 467 fr nw&swl 815.03-ac lse, 2500 fr swl 1900 fr nwl E. J. Rouby sur 252, 2 mi nw Tesoro fld, 3 mi sw Agua Prieta fld, 3 mi w Cadena fld, abnd 11-4-46 at 5207.

Webb County—Failures: Chas. H. Houston-Jos. S. Mellard's D. D. Hacher 1, 2500 w 2173 s fr nec Hacher rch, 1000 fr nl 3252 fr el porc 58, abnd 11-4-46 at 5205.

Texas Co.'s Grant Adami 1, 1650 fr s&el Wm. Adami sur 10, on 1065.48-ac lse, 2½ mi sw Adami fld, abnd 11-6-46 at 1510.

LOWER TEXAS COAST WILDCATS

Live Oak County—Failure: Ray R. Clark's C. S. & W. H. Herring 1, 330 fr el 10 fr sl 155 fr nl 990 fr wl 5-ac lot 1240, Dr. Simmons Farm Lots sbdn, 3 mi ne Simmons City, 1250 fr el 6150 fr nl John Buchanan sur, abnd 11-3-46 at 2065.

San Patricio County—Failure: H. R. Smith-Dan Auld-Atlantic's F. E. Sevier 1, c nw¼ ne¼ sect 6, 2nd addn, Taft Farm lds, G. T. Tabor sur, on e flk shallow Taft fld, 160-ac lse, abnd 11-8-46 at 11,023.

Willacy County—Distillate Discovery: Magnolia's F. Armendaiz 2, 5350 fr nl 6540 fr el 8248-ac lse, San Juan de Carricitos Gr, 6½ mi se Willamar fld, pay 8585, perf 60 shots 8585-8600, flow dist, no gge, 13 mln gas, comp 11-1-46 at 9707.

LOWER TEXAS OUTPOST

Victoria County — E. Teleferner Failure: Floyd L. Karsten's Luling Foundation 1, 466 fr ne&nwl 192-ac lse, J. S. Hendershot sur, ¾ mi sw fld, near H. J. Porter's Miller 1 gas well, abnd 11-6-46 at 4457.

LOWER TEXAS COAST NEW PAY TEST

Kleberg County—Borregas Oil Discovery: Humble's King Ranch-Borregas 2, 7815 fr sl (at ra) 30,781 w of el (at ra) of 40,591-ac lse, Santa Gertrudis Gr, pay 6364, perf 22 shots 6373-80, flow 137.99 bbls; 42-gr oil, 0.3% wtr, ⅛-in. gor 1050/1, tp 1300 lbs, comp 10-31-46 at 8500.

UPPER TEXAS COAST WILDCATS

Brazos County—Failure: A. E. Burgin et al's N. A. Stewart 1, 1000 fr swl 800 fr nwl 62.5-ac tr, 6000 fr nwl 5750 fr nel Stephens Jones sur, abnd 11-9-46 at 3710.

Matagorda County — Failures: Lynn Oil Co.'s General American Life Ins. Co.-W. D. Cornelius 1, 160 n of common sw&se cor lots 3&4, Wadsworth area, 7000-ac lse, S. R. Fisher Lge, blk 5, abnd 11-7-46 at 8890.

Pure's State of Texas 1, Blk 308, 660 fr s&wl blk 308, 640-ac, N. Matagorda Bay, 7 mi sw Palacios, abnd 11-7-46 at 5775.

UPPER TEXAS COAST NEW PAY TEST

Colorado County—Altair Deep Distillate Discovery: Superior's Mrs. Myra S. Pryor 4-A, 1390 s alg swl P. O. O'Daugherty sur fr nwc same, th 1565 sw at ra to lcn, 800-ac lse, BBB&C sur, perf 72 shots 10,174-192, flow 117 bbls 50-gr dist, 4,600,000 gas, gor 40,000/1, 16/64-in, tp 3050 lbs, comp 11-5-46 at 10,366.

WYOMING WILDCATS

Carbon County—Failure: Atlantic's Seaverson 1, (OWDD) sw se sw 30-18n-84w, Saratoga area otd 3635, Dakota 4025, Sundance 4370, Nugget 4540, abnd 11-10-46 at 4703.

Weston County—Failure: Mule Creek Oil's Copeland 1, c nw nw 14-42n-62w, Sheep Creek Lakota 3941, abnd 11-5-46 at 3945.

ADVERTISING RATES

Trading Post Section

Regular classified advertisements for this special section, set in type this size without border, takes flat-rate of 7 cents per word for the first insertion and 5 cents per word for each subsequent insertion of same copy. Display advertisements for this section, set in suitably larger type with ruled border, are $5.00 per inch for the first insertion and $4.00 per inch for subsequent insertions. Remittance must accompany copy which should be sent to:

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Trend Toward Gas Heating Equipment Noted by Agency

Reports from builders to the National Housing Agency indicate that the present trend in heating installations is toward gas equipment, with more than half the installations to be of that type and oil and coal fighting for the remainder of the market.

A recent survey showed that in new construction, 52 percent of the installations are to use gas as fuel, 27 percent coal, and 21 percent oil.

Several factors are involved in this choice, the major one apparently being the uncertainty of a steady supply of coal and its increasing cost, which has led home owners and others to seek a fuel with a supply less susceptible to interruption by strikes or other causes.

Factors tending to lead builders into the installation of gas equipment rather than oil are the relatively higher cost of the original oil installation and the spreading distribution of natural gas with a consequent reduction in gas rates to consumers.

To considerable extent, however, the choice of heating equipment is based upon the relative accessibility to the competing fuels. In Texas, for instance, about 95 percent of new installations will use gas and 1 percent will use coal.

"Best Bet Yet"

Here's a compact Sucker Rod Wiper designed as Well Pullers wanted it. Short overall height, 4", just right height for wrenching rods. Weight complete, only 29#. Easy to handle, comes mounted on pony rod ready to be used. Tough, natural rubber wiping webs squeegee rod, box and square free of oil. No oil leaves hole or flips on crew... Rubbers stand enough pressure to take oil to tank or sump if well flows. Wipes any size rod, 5/8" to 1¼".

Duo-Wipe style, code: SUBZONE, shown above, has two wiping elements. Quadra-Wipe Style, code: SUBSOLAR, has four rubbers for use with extra-low gravity oil. Both styles make up on standard tubing sizes at the well head.

Cut-away drawing shows sturdy construction. Handy Table Plate Head, available for both models, holds rod tools and elevators.

Write for Catolog No. 310

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808 Graybar Building, New York 17
931 Russ Bldg., San Francisco 4

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Poet's Nook

The modern bathing beauty
Owes most of her success
To putting just a little more
Into just a little less!

Hints for Householders

Despite the high cost of travel, crowded hotels, and the boredom of spending several days in a town in which you know only one person, every man should accompany the bride on the honeymoon. It may be the last vacation you will ever have.

Life Is Like This

"What did the audience do when you told them you had never paid a dollar for a vote?"

"Well, some of 'em cheered, but most of 'em got up and left."

Sign of the Times

"Is this the hotel clerk?" inquired the guest over the phone.

"Yes, it's the clerk, stupid. And what's eating you now?"

"That's what I want to know!"

Loose Talk, Fast Company

The boys from the back room were gathered at the grave of a fellow gambler.

"Spike," droned the preacher, "is not dead. He is sleeping."

Came the inevitable voice from the rear: "I've got a grand that says he's dead."

He Married a Woman

"Leaving so soon?" protested a poker player as the heavy winner, a meek little fellow, got up to go."

"Yep. Wife's orders."

"Wife's orders! What are you, a man or a mouse?"

"A man. My wife's afraid of a mouse."

Sounds Logical

"Doctor, the patient you left with me last night developed a temperature of 105!"

"My goodness, nurse. What did you do?"

"Put him in bed with a patient who had chills."

Justice Frustrated

"Can't this be settled out of court?"

"Sure, an' that's what we wuz doin', your honor, when the cops came along."

The Woman's Way

"Box of cigars, please."

"Strong cigars, Ma'am?"

"Oh, yes, very strong. My husband bites them terribly."

This Is Salesmanship

"These are beautiful cars, but I've been warned that the depreciation is awful. Show it to me, will you?"

"To tell the truth, lady, we found it such a constant source of worry, that we had it removed from all our cars."

In the Rough

"My wife says that if I don't give up golf she's going to leave me."

"That's tough."

"Yep, I'll miss her."

Give Him Time

"We have been married a year and never quarrel. If a difference of opinion arises and I am right, my husband gives in."

"But what if he is right?"

"That has not yet occurred."

Short Story

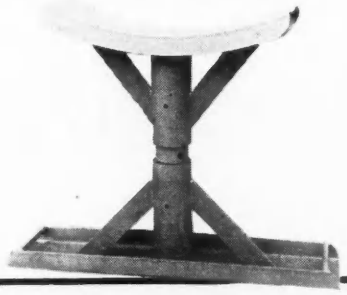
This is about a little doggie
Who met a little tree.
The little tree invited,
"Come on, have one on me."
The little pup replied,
As gentle as a mouse,
"Thank you, little tree,
"I just had one on the house."

At the Zoo

O, back and forth and back again
within your cage you roam;
Poor beast, I know some married men
Who do the same at home.
Like you they eat their meals and growl
And bravely wear their scars.
No longer are they free to prowl
Between the grills and bars.

OWEN

IT'S SIMPLE AND EASY TO LEVEL BOILERS WITH OWEN BOILER JACKS



You save during setting-up time when Owen Boiler Jacks are used because only one man is required to level boilers. Owen Jacks are composed of only three pieces . . . base, cradle and screw . . . and a bar is the only tool required to raise or lower the jack. Hand grips simplify handling and coarse threads on the screw lift heavy loads with a minimum of effort.

Keep your boilers operating at highest efficiency and lowest maintenance cost . . . keep them level with Owen Boiler Jacks.

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HOUSTON LABORATORIES

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Podbielniak Gas Analysis

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Long Distance 267 Box 132, Houston, Tex.

A. L. Nickerson has been elected a member of the board of directors of the Socony-Vacuum Oil Company, Inc. He has worked for Socony-Vacuum since 1933, rising from service station salesman through various positions in marketing operations to the assistant general managership of the Eastern Marketing Division. In 1945, he went to London as chairman of the board of the Vacuum Oil Company, Ltd.

D. B. Taliaferro of Bartlesville and **R. K. Guthrie** of Dallas, staff engineers of the U. S. Bureau of Mines, have been transferred to Wichita Falls, where a substation has been established to assist operators in their extensive secondary recovery programs.

John H. Murrell, petroleum engineer and geologist with DeGolyer & McNaughton, Dallas, addressed the Houston Geological Society November 25 on "The Oil Fields of the Middle East." He was a member of the Petroleum Reserves Corporation technical oil mission visiting the Middle East in 1943-44.

Floyd Green, conservation attorney of the Oklahoma Corporation Commission, spoke on "The Mechanics of Production of Oil and Gas" before the National Association of Railroad and Utility Commissioners, at Los Angeles.

S. W. McGaha, division sales engineer of the Lane-Wells Company, Oklahoma City, spoke on radioactivity well-logging at an Ardmore, Okla., Geological Society meeting.

J. P. D. Hull, business manager of the American Association of Petroleum Geologists, has returned to Tulsa from a conference with officials of the Pacific Coast Section, A.A.P.G., in connection with the 1947 annual geological conclave, to be held in Los Angeles, March 24-27.

Jack Lynn, L. W. Stalcup, Jack Herley, Jim Ogden, George Reeves and **J. P. Butler** have been elected to the board of governors of Oilfields Service Association, Long Beach, Calif.

Frank Boyd, Union Oil Company field engineer, has been transferred from Santa Fe Springs to Santa Maria, Cal.

Howard J. Jones has been appointed manager of industrial relations, and **Horace J. Jones** manager of industrial engineering for The Colorado Fuel and Iron Corporation.

Cornelius B. Savage, H. G. Ainsworth and **Thomas F. Tobin,** all of Fort Worth, have incorporated the Phoenix Petroleum Company to operate in Texas.

Frank Tatnall will address the Houston Engineers Club December 11 on "Making Structures Stronger and Lighter." He is manager of testing research for Baldwin Locomotive Works, in charge of continuing development of static and dynamic testing equipment, experimental stress analysis and aerodynamic apparatus.

Norman J. McGaw, general vice president, Shell Oil Company, Inc., New York, is moving to the company's San Francisco headquarters in a similar position. Joining Shell in 1925 as a statistician in the San Francisco office, he became assistant to the president in St. Louis in 1933, and has been a vice president since 1939. A second appointment in the Shell organization elevates **H. S. M. Burns** to senior vice president east of the Rockies, with headquarters in New York. Burns joined the company over 21 years ago in California as a geophysicist in the exploration department.

Norman J. McGaw

Herman A. Dearing and **Robert M. Dearing,** both of Dallas, have incorporated the firm of Dearing, Inc., to operate oil properties of the late **Willis R. Dearing.** Headquarters are in the Tower Petroleum Building, Dallas.

Albert I. Ingham, who has been with Shell Oil Company for seven years, has become assistant geologist with the Pennsylvania Bureau of Topographic and Geologic Survey.

Glenn Wilson, chemical engineer of the technical service division at Humble Oil & Refining Company's Baytown refinery, will speak at a meeting of the Houston Chapter API November 26, in the Texas State Hotel. His subject is "New Products from Petroleum."

James Don Wiet, formerly chief of the petroleum section, industry branch, economics division of the Office of Military Government for Greater Hesse, Germany, has been made a district landman at Amarillo, Texas, for Phillips Petroleum Company.

Vincent Emanuel has resigned as design and construction supervisor at Stanolind Oil & Gas Company's Tulsa laboratory, and accepted a post with Grant Oil Tool Company, Los Angeles.

Grover E. Murray, Jr., delivered a paper on "The Cenozoic Deposits of Mississippi and Adjacent Areas" at a recent meeting of the Tulsa Geological Society.

C. T. McCord, geologist with Lyons and Prentiss Oil Company, spoke before geology and petroleum engineering students at Louisiana State University on "Promoting Wildcat Wells."

Dr. Fladger F. Tannery has been appointed an assistant comptroller for Humble Oil & Refining Company, Houston. He is a former associate professor of accounting at the University of Texas.

Dr. E. K. Soper, associate professor of economic geology at University of California at Los Angeles and for several years petroleum consultant for California State Lands Commission, has resigned to become consultant with Signal Oil and Gas Company, Los Angeles.

Charles F. Codrington has been promoted from assistant to the manager to sales manager of the blower and compressor department of the Allis-Chalmers Manufacturing Company, Milwaukee, succeeding **A. E. Caudle,** resigned. Codrington joined Allis-Chalmers' graduate training course in 1930 following his graduation from Texas A & M College.

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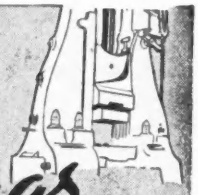

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issue of the Oil Weekly to be published February 10, 1947

MEN IN THE INDUSTRY NEWS

Darrell Hughes Hamric has been elected a vice president of the Republic National Bank of Dallas. He has been an assistant vice president of the Bankers Trust Company of New York since 1945. His banking career began in 1931 in the credit department of the Bank of Manhattan Company, New York. He became assistant cashier in 1938, engaging in loan and contact work. He was in the Army Air Corps from 1942-45.

Darrell H. Hamric

»

Charles O. Roome has been appointed manager of the St. Louis district of Goodyear Tire & Rubber Company's Mechanical Goods Division. He has been a member of the New Orleans sales staff since 1937. He replaces **John E. Ragan,** St. Louis manager since 1935, who has been transferred to Atlanta as district manager of mechanical goods sales.

»

Clifford Shupert has joined the Moorlane Company's sales order department. He went there from the Tulsa office of Jarecki Manufacturing Company, which he served for 20 years.

»

J. T. Myers was elected vice president in charge of sales and production of the Davey Compressor Company. He served the past year as assistant general manager. He has been connected with the company for five years.

M. G. McCool has been appointed vice president in charge of sales and manufacturing and a member of the board of directors of the American Iron & Machine Works Company. He joined the firm in 1935 and functioned as district manager in West Texas until 1940, when he became secretary and general sales manager at Oklahoma City. He has had previous connections with Standard of Venezuela and Phillips Petroleum Company.

M. G. McCool

»

F. W. Smith, diesel power engineer for Stewart & Stevenson Services, has been appointed sales representative for the company's Wichita Falls, Texas, offices, opened recently to serve northwest Texas with engineered power employing General Motors diesel engines and Continental Red Seal gasoline engines. Main offices are at 4516 Harrisburg Boulevard, Houston.

»

Albert R. Knauss has been named manager of Allis-Chalmers Manufacturing Company's office at Memphis, Tenn., and will be transferred from the Tulsa office, where he was also manager. He joined the company at Tulsa as service engineer for electrical equipment in the oil fields, and then was assigned to sales in 1938. He rejoined the company in 1945 following his release from the armed forces.

Deaths

Arnold Schlaet, 87 died in St. Petersburg, Fla., November 14, of coronary occlusion. He came to the United States from Mecklenburg, Germany, in 1875. His first business venture was in the carbon black and oil business in Pennsylvania. He formed later associations in Texas, one of which, the Producers Petroleum Corporation, became The Texas Company. He left Texas in 1905 but controlled the company until his retirement in 1920 as chairman both of the board of directors and the executive committee.

»

R. E. Post, 69, Fairbanks, Morse & Company, Washington, D. C., office manager for ten years, died November 13. He was with E. and T. Fairbanks and Company before its merger in 1923 with Fairbanks, Morse & Company, at which time he became manager of the Baltimore branch office.

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NO-SMOKE

STANDCO BRAKE LINING
for the easiest brake known. It "feeds off" evenly. Standco never scores brake rims. See page 2808 Composite Catalog.
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- Detailed surveys at only a few cents per acre

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C. L. Lamkin

J. T. Tucker

Emsco Makes Executive Changes In Texas and California Areas

C. L. Lamkin, vice president of Emsco Derrick & Equipment Company, has been transferred to the main offices at Los Angeles, in which position he will handle all phases of the company's business from the standpoint of management. He has been serving as plant manager at Houston, and will be succeeded in that position by Paul Courtney, former sales manager of the Houston branch. J. T. Tucker becomes sales manager. The latter was field service manager for Emsco in the Mid-Continent area.

Paul Courtney

Sharp Increase in Production Of FWD Trucks Is Predicted

A sharp increase in the production of FWD trucks has been scheduled by The Four Wheel Drive Auto Company.

Forecast for the 1946-47 fiscal year is for an $18 million demand, according to Robert A. Olen, general manager of the company. This represents a $9 million backlog and an analysis of 1946-47 truck requirements, he said.

Employment at the company's Clintonville, Wisc., factory, already at a peacetime high, is climbing rapidly. Although there is still a serious materials shortage and FWD production has been hampered by strikes and shutdowns in factories of its suppliers, the FWD factory is working on a 24-hour per day basis manufacturing trucks.

Dowell's Research Laboratories Near Tulsa Officially Opened

More than 200 Tulsans affiliated with the oil business attended the official opening of Dowell Incorporated's new research laboratories, located north of the city, on November 6.

In three large units, the plant houses a plastics division, research department, and workshop.

Among equipment shown at the meeting was a test well, designed to show what goes on at the bottom of the hole and used to test various materials under pressure equal to that of a drilling well.

Ohmer Corporation Becomes Rockwell Manufacturing Company Subsidiary

Rockwell Manufacturing Company has purchased Ohmer Corporation of Dayton, Ohio, which makes the twelfth wholly-owned subsidiary or division in the Rockwell group. The Ohmer Corporation was founded in 1898 and has at present about 1100 employees. The regular line of products will be manufactured, and possibly additional lines of Rockwell products will be added. N. J. Kenny has been elected president of Ohmer by the reorganized board of directors. J. Allen Harlan, former president for the past year, will remain as vice president. Kenny was president of National Meter Company until its amalgamation with Rockwell in 1941, since which time he has served as assistant to Willard F. Rockwell, the president. The new Ohmer board of directors is W. F. Rockwell, chairman; N. J. Kenny; W. F. Rockwell, Jr., and J. A. Harlan, vice president; E. W. Meyers, secretary-treasurer; F. J. Schnacke, and M. J. Carl.

700 Ex-Servicemen Attending Hughes Machine Shop Class

GI Joe is doing all right with his school work in Houston, according to officials of the Hughes Tool Company, which is giving more than 700 of them a course in machine shop practice.

The ex-soldiers are taking three hours of theory in the plant yard under the tutelage of University of Houston professors. The remaining five hours of the work day are spent in the shops where the theory is applied to actual work.

Work turned out by the GI's is running well above standards for beginners, say the Hughes officials.

Wiley B. Gardner

H. H. Collins

Patterson-Ballagh Announces Changes in Field Personnel

Patterson-Ballagh Corporation, a division of Byron Jackson Company, has made changes in oil field representatives.

A. L. (Preach) Gooden, formerly at Alice, Texas, has been transferred to

A. L. Gooden

C. J. McKernan

Rangely, Colo., to handle sales and service of oil field rubber specialties. J. H. Buchanan handles the line in the Casper, Wyo., area. H. H. (Bud) Collins has taken over Gooden's territory. He formerly worked for Wilson Supply Company in the Houston area, and joined Patterson-Ballagh in 1944.

C. J. (Chili) McKernan, employed by the company in July, is now stationed at Odessa, Texas. He was previously a

DAN L. CLARK W. M. AVERILL RUPERT COX

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"...and a group of us could team up to OPERATE THIS PLANT"

SEE PAGE 2

Wilson Supply employe in South Louisiana and at Natchez, Miss. McKernan will be factory representative in West Texas, Texas Panhandle, and New Mexico area. Wiley B. Gardner is now representing sales and service in North Louisiana, Arkansas and East Texas fields from headquarters at Mooringsport, La.

Peavy Appointed Southwest District Manager for Dresser Industries

Elton E. Peavy has been appointed district manager for the sale of Dresser products in the southwest territory including Texas, Louisiana, Oklahoma, Arkansas, Mississippi and New Mexico. He will be responsible for the sale of all Dresser couplings, fittings and repair products. Peavy has been associated with the company for some months, working both at the factory and in the field. He succeeds H. R. Shidel who will direct the sale of Dresser welding fittings in this area and supervise the Houston warehouse.

Elton E. Peavy

Fischer & Porter Changes Name Of Its Products to "Flowrators"

Fischer & Porter Company, manufacturer of variable area type flow rate instruments, heretofore called "Rotameters," will change the name of its products to "Flowrators."

The first use of the old term "Rotameter" appears to have been made about 40 years ago by an early continental manufacturer of transparent tapered-tube variable-area flow rate indicators. It is indicated that this early manufacturer devised a plumb-bob shaped metering element with biased notches milled on the underside of the metering head to impart a rotating motion.

Greatly improved operating stability resulted from use of these rotating elements. Though the name "Rotameter" failed to describe either the function of the instrument or any fundamental operating requirement, it has stuck. Fischer & Porter Company as a specialist in the manufacture of variable area, indicating, recording, recording-controlling, and integrating flow rate instruments, has devised the new "Bead-Guide" metering tube and other more positive methods of float stabilization. The old term thus has lost all significance as applied to the company's products.

QUAKER

WRITE
WIRE
ORDERS

Consult Pages 2505 and 2506 in The Composite Catalog

Reg. U. S. Pat. Off.

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Quaker manufactures every type of ring packing used in the oil fields or refineries for oils — heavy and light, hot and cold, for all types of pumps and equipment, centrifugal, rotary, reciprocating.

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The OIL WEEKLY
Monthly International Section

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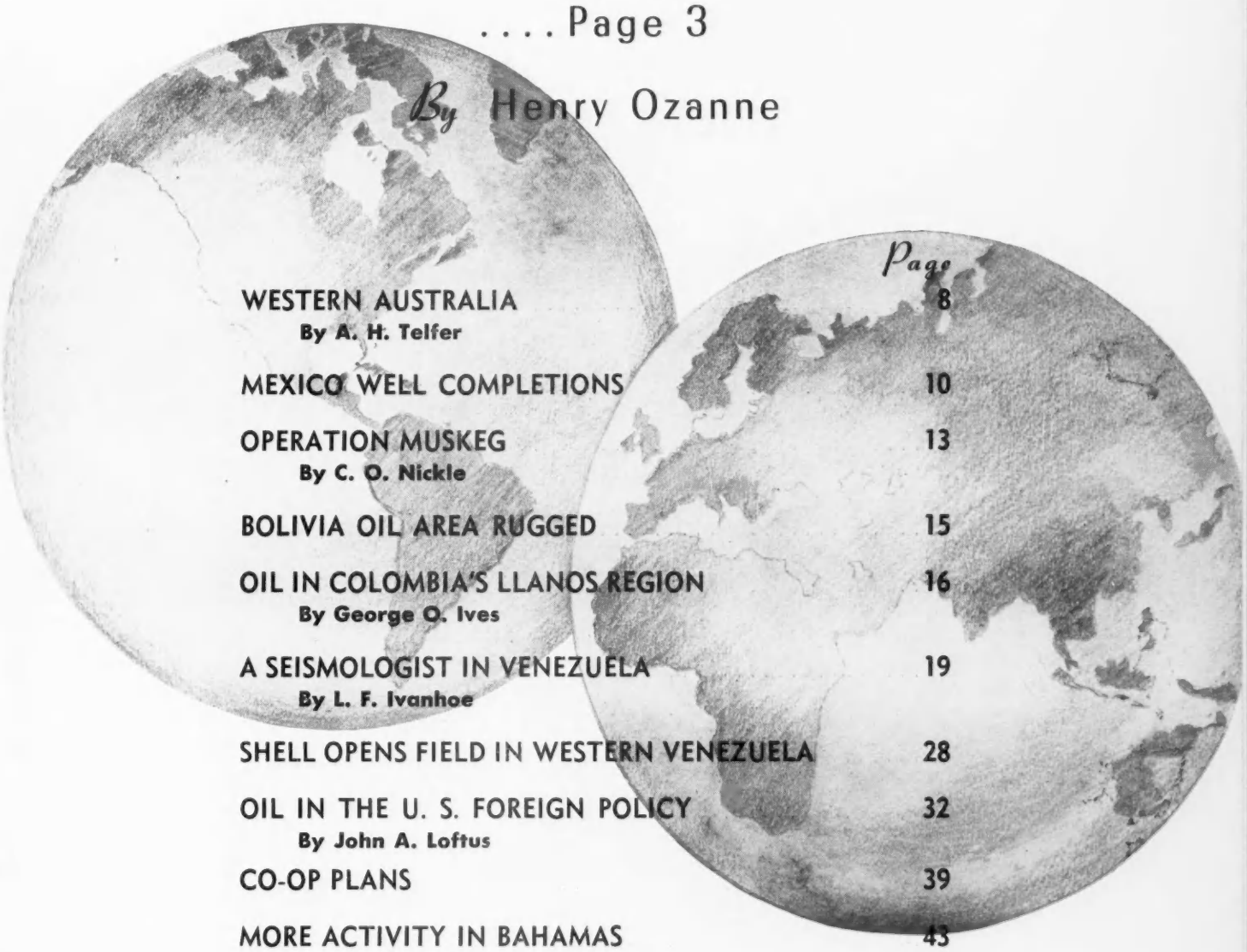
By Henry Ozanne



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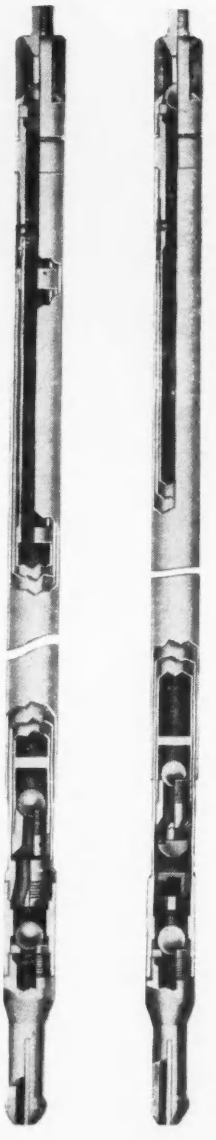
Hard to pump sand?

...not for an oilmaster MULTIPLE TUBE PUMP!

Look carefully at this picture! This sand was pumped by an Oilmaster Multiple Tube Pump . . . *without scoring of the metal surface of the pump . . . without wasteful downtime.* Unsurpassed performance in outlaw wells such as this makes the Multiple Tube a favorite of production men throughout the oil industry.

Because the fluid being pumped acts as permanent packing between the tubes —a packing that never wears cut—and because the Oilmaster Multiple Tube Pump has from 7 to 15 times more clearance between working parts than ordinary pumps, there is more fluid cushion to protect parts against wear . . . more space for abrasive sand particles to pass through the pump without expensive freezing or sanding up.

Especially designed and constructed to meet the need for an oil well pump to operate efficiently and economically in difficult wells under severe sand conditions, the Multiple Tube Pump gives superior performance under normal conditions too—assures greater recovery at less cost.



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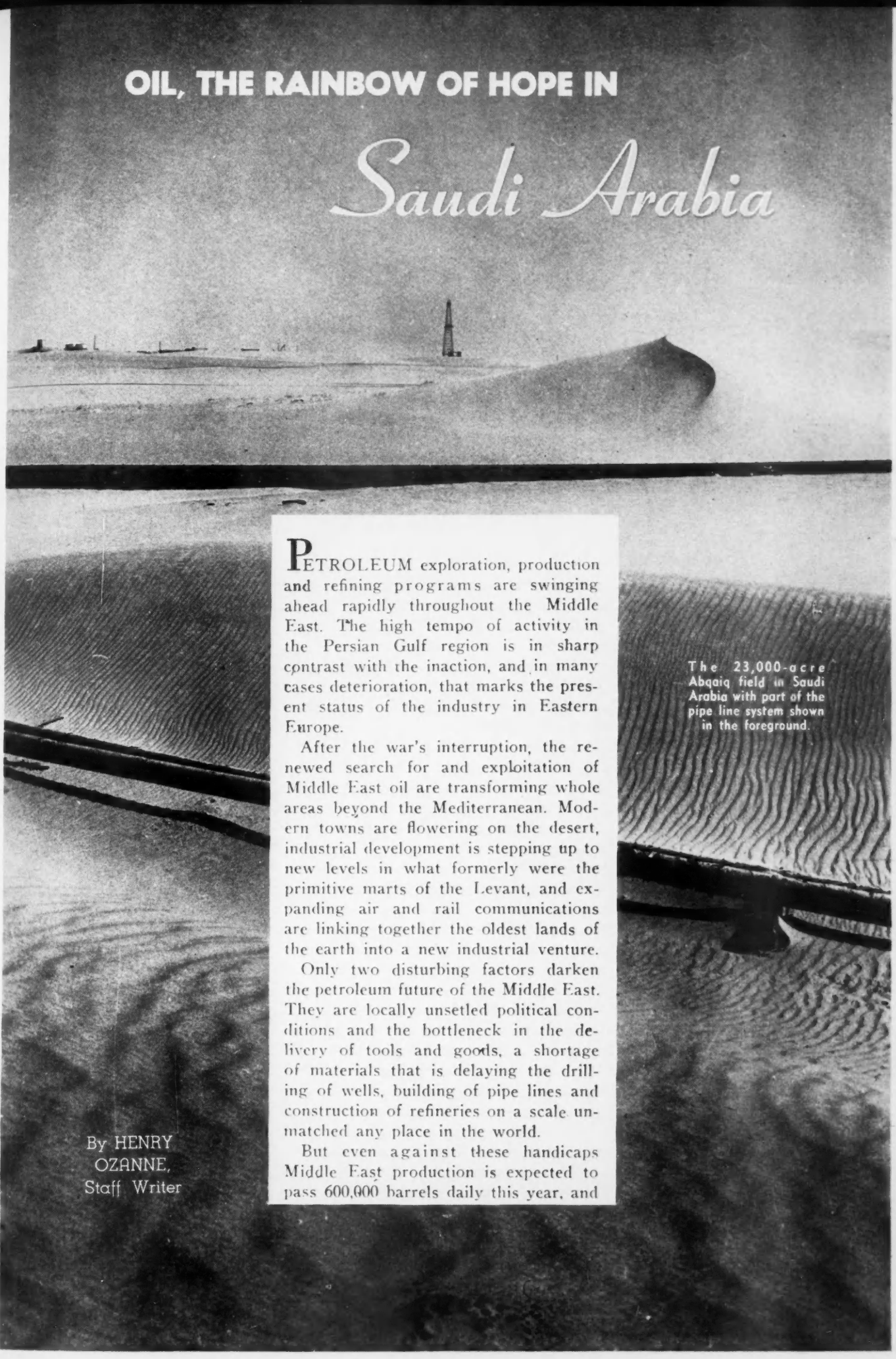
OIL, THE RAINBOW OF HOPE IN *Saudi Arabia*



The 23,000-acre Abqaiq field in Saudi Arabia with part of the pipe line system shown in the foreground.

By HENRY OZANNE, Staff Writer

PETROLEUM exploration, production and refining programs are swinging ahead rapidly throughout the Middle East. The high tempo of activity in the Persian Gulf region is in sharp contrast with the inaction, and in many cases deterioration, that marks the present status of the industry in Eastern Europe.

After the war's interruption, the renewed search for and exploitation of Middle East oil are transforming whole areas beyond the Mediterranean. Modern towns are flowering on the desert, industrial development is stepping up to new levels in what formerly were the primitive marts of the Levant, and expanding air and rail communications are linking together the oldest lands of the earth into a new industrial venture.

Only two disturbing factors darken the petroleum future of the Middle East. They are locally unsetled political conditions and the bottleneck in the delivery of tools and goods, a shortage of materials that is delaying the drilling of wells, building of pipe lines and construction of refineries on a scale unmatched any place in the world.

But even against these handicaps Middle East production is expected to pass 600,000 barrels daily this year, and

Arab members of a drilling crew at Abqaiq. It requires approximately two years to train an Arab drilling crew.

if political hazards do not interfere too seriously, it will pass the million-barrel-a-day mark probably early in 1948.

Saudi Arabia's Plans

Of the entire Middle East, Saudi Arabia is now one of the more favorably circumstanced nations, politically and economically. She is at present virtually free of internal political issues and external pressures and is demonstrating a keen interest in her whole economic future. The $10 million credit to Saudi Arabia has been approved by the Export-Import bank, and an 11-man financial delegation, headed by Finance Minister Abdullah al Sulayman has reached the United States for conference with Washington officials. The credit would be used to modernize Saudi Arabian transport and agriculture with equipment and supplies purchased in the United States.

Former Secretary of Interior Harold L. Ickes, writing in his syndicated column, "Man to Man," has criticized the Saudi Arabian loan and charges that "without the consent, or even the knowledge of the American people, we have been contributing to King Ibn Saud through some convenient device such as the Export-Import Bank, Lend-Lease or the RFC." He adds that the Arabian American Oil Company "has already advanced royalties of some $12 million to the King, and it is fair to assume that further demands will be made."

But everywhere in Saudi Arabia oil is the great rainbow of hope and the search for it is going on feverishly. The concession of the Arabian American Company covers more than 400,000 square miles, an area one-fifth the size of the United States. Standard Oil Company of California obtained the original concession in 1938, but subsequently The Texas Company asquired a half interest in it. Arabian American Oil Company

The Middle East oil region, regarded as the site of the world's largest oil reserves, is in the midst of a great expansion program as well as unsettled political conditions. Because of these factors, which could play an important role in world peace, The OIL WEEKLY is presenting a series of three articles on recent oil trends in the Persian Gulf sector. The second article, on Iran, will appear October 7.

The Ras Tanura refinery. Arab workmen react well to American training.

is their wholly-owned operating subsidiary.

Oil was discovered in Saudi Arabia in 1935 at the Damman field on the Persian Gulf. However, six wells were drilled before No. 7 tapped a deeper horizon in 1938 and really opened Arabian oil history. Now there are three producing fields with recoverable reserves estimated at from 4 billion to 6 billion barrels, and production is nearing 200,000 barrels a day. In the Damman field alone, 28 wells are now producing 100,000 barrels a day, and the field's reserves are put at 800 million barrels.

Dhahran Blossoms

At the Damman field the former desert camp of Dhahran has been transformed into a modern town. Now American buildings and American homes dot the dome of the structure where oil was first found in Arabia. Dhahran is a California-type community, boasting air-conditioned bungalows, cultivated lawns and flowerbeds, and most of the gadgets of Main Street.

Eighty-five homes have been completed to date in Dhahran and 35 more are under construction. Whole families are being moved to the town from the United States, and a complete and interesting community life already has been established. The company employes and their households have a theater with daily movies, a dining hall, club house, swimming pool and recreation center. There is a school for the children and there are churches in nearby Bahrein. A clinic and hospital are in operation with five doctors and 20 nurses in attendance at Dhahran and at Ras Tanura, 40 miles northeast.

Dhahran has its own telephone system, waterworks, and gas and electric power facilities. The company sponsors a program of language interchange between its personnel and the natives, and three American and four Arab teachers are now engaged in this work.

On its entire concession, Arabian American has 900 Americans employed, 7400 Arabs and 900 Italians. The company has spent more than $150 million in Saudi Arabia and further heavy expenditures are planned. Projected improvements at all the chief centers of the concession include extensive housing development, new motor vehicles, telephones, wireless, office buildings, hospitals, ambulances, power systems and paved roads.

An active drilling program is under way at the Abqaiq field, 45 miles southwest of Dhahran. An area of 23,000 acres has been found to be productive,

Aerial view of the American and Arabian communities at Dhahran, and the Dammam producing field. Dining hall, sports facilities, movie theatre, recreation hall and swimming pool are shown in the foreground with the homes of American employes near by. The village built for Arab workmen is at upper right. In the center are offices, machine shops, garages, the power plant and other facilities which serve the community and the oil field. Dhahran is in the center of the Dammam field where oil was first discovered in Saudi Arabia.

although to date production is confined to an area seven miles by five miles, with the wells spaced two miles apart. Abqaiq reserves are estimated at 2½ billion barrels. Oil was discovered there in 1941 and until now production from the five wells drilled has been about 70,000 barrels a day. Four more wells are to be drilled soon.

Another producing field is at Oatif, 20 miles north of Dhahran. The discovery well here was brought in in 1945, but further development is being held in abeyance. Oil also has been discovered at Abu Hadriya, 100 miles northeast of Dhahran.

All this Arabian crude is of asphaltic base with relatively high gravity and a high percentage of hydrogen sulphide which is removed at the Dhahran stabilizing plant. Best production at the Damman field is from about 4700 feet, and at Abqaiq, from about 6500 to 7000 feet.

Ras Tanura, the refinery and shipping center for the Arabian American concession, is built on a peninsula jutting out into the Persian Gulf. It is connected by pipe lines, highways and waterways with the desert fields and with world markets. There is a $40 million refinery at Ras Tanura, completed last year, producing fuel oil, diesel oil and all-purpose gasoline. Its entire output, about 85,000 barrels a day, has been going to the U. S. Navy.

Two Pipe Lines

Ras Tanura gets its crude from two pipe lines that connect with the fields at both Damman and Qatif. Its marine terminal loads tankers at the rate of about 12,000 barrels an hour. Crude is now handled at the rate of 9000 barrels an hour, but improvements are planned which will double that capacity. The average tanker is loaded in from ten to 12 hours.

Ras Tanura has the most modern machine shop in the Middle East and a power plant which in time will supply all Dhahran. It also has a motor repair shop and servicing facilities, a laundry, commissary and other modern conveniences. A 300-line telephone system is now being installed.

Summary of Middle Eastern Oil Crude Reserves

Iran	7,000,000,000 bbls.
Iraq	5,000,000,000 bbls.
Kuwait	9,000,000,000 bbls.
Qatar	1,000,000,000 bbls.
Saudi Arabia	6,000,000,000 bbls.
Total	28,000,000,000 bbls.

Concessions	Percent of Total in Middle East
N. R. Gulbenkian	1.10%
5% Iraq	
5% Qatar	
Anglo-Iranian	47.87%
100% Iran	
50% Kuwait	
23¾% Qatar	
23¾% Iraq	
Shell Group	5.28%
23¾% Iraq	
23¾% Qatar	
French Group	5.28%
23¾% Iraq	
23¾% Qatar	
Gulf Oil Corp.	16.67%
50% Kuwait	
California Standard	9.26%
50% Saudi Arabia and Bahrein	
The Texas Company	9.26%
50% Saudi Arabia and Bahrein	
Jersey Standard	2.64%
11⅞% Iraq	
11⅞% Qatar	
Socony-Vacuum	2.64%
11⅞% Iraq	
11⅞% Qatar	

The preceding percentages translated into crude reserves:

Anglo-Iranian	12,925,000,000 bbls.
Shell	1,425,000,000 bbls.
French	1,425,000,000 bbls.
Gulbenkian	300,000,000 bbls.
Gulf	4,500,000,000 bbls.
Calif. Standard	2,500,000,000 bbls.
Texas Co.	2,500,000,000 bbls.
Jersey Standard	712,000,000 bbls.
Socony-Vacuum	712,000,000 bbls.

Refineries

Abadan	
Anglo-Iranian	385,000 b/d
Ras Tanura	
Arabian American	85,000 b/d
Bahrein	
Bahrein Petroleum Co.	65,000 b/d
Haifa	
Consolidated Refining co. (50% Anglo-Iranian, 50% Shell)	83,000 b/d
(expansion planned to 200,000 b/d)	
Tripoli	
Iraq Petroleum Co.	14,000 bbls.
(now cut down)	

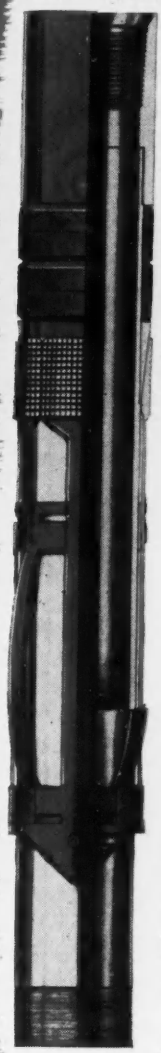
Forty modern homes are being built at Ras Tanura. Typically, they consist of a large living room and dining alcove, two bedrooms, a large kitchen with electric and gas facilities, a modern bathroom, storage space and a screened porch.

A 12-inch pipe carries Abqaiq crude to Dhahran and a second 14-inch line is projected. Both lines will have a capacity of 200,000 barrels daily. From Dhahran, crude can be sent either to the Ras Tanura refinery, or by underwater pipe line to the island of Bahrein, 20 miles offshore, where the Bahrein Petroleum Company is now processing 75,000 barrels of crude daily.

Arabian American has negotiated rights with Transjordan, Palestine and Lebanon for its projected 1000-mile, 26-inch line to the Mediterranean. The route and the terminal are still undecided, and construction work may not get under way for another year. Furthermore, the political arrangements already consummated do not guarantee the course of the big line. If the Jewish-Arab conflict persists, many observers believe the pipe will be laid straight across Saudi Arabia, passing below Transjordan and over the Sinai Peninsula to a terminal in Egypt.

Drilling in Saudi Arabia is costly and arduous. First, a small amount of water is trucked to the well site and is used for drilling a small water well. Water from this first well is then used to drill a larger one, and thus sufficient water is obtained to drill the oil well. Hot water is often encountered at about 2000 feet, and its pressure is held down by mud.

All production equipment is hauled from the United States and drilling crews brought from the U. S. are paid during travel time. About two years is required to train an Arab drilling crew.



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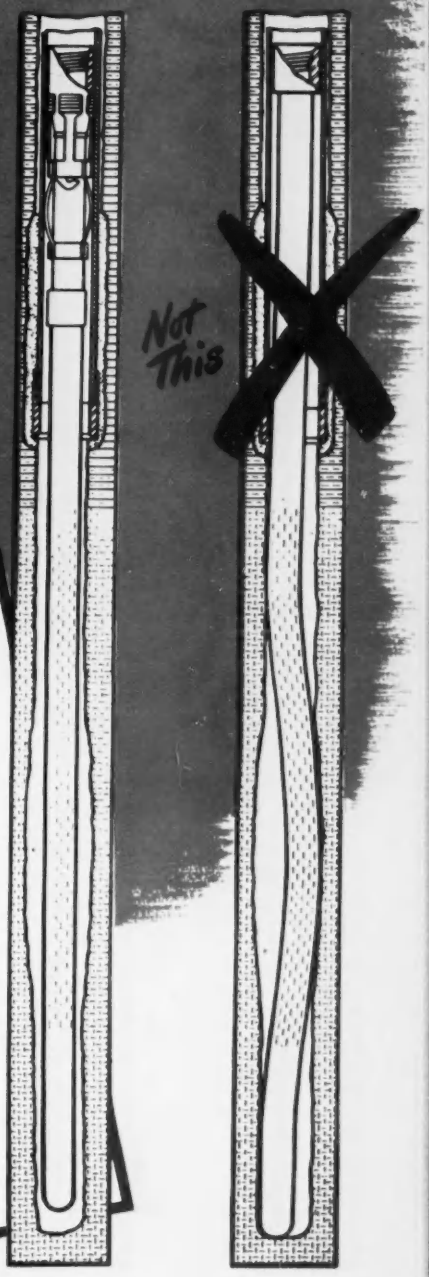

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Western Australia

By A. H. TELFER

Under Secretary, Mines Department, Government of Western Australia, Perth, Australia.

THE area of Western Australia that has been mapped geologically in detail for oil purposes is very small when compared with the size of regions with oil possibilities. Most of the work done has been rather more in the nature of geological reconnaissance than detailed mapping. Actually, only eight wildcats have been drilled in the area since 1921 with no oil discovered, though some of the wells did pick up small shows.

The accompanying map shows approximately the areas of Western Australia where Palaeozoic or later rocks occur. These areas fall roughly into the following divisions: Ord River Area-East Kimberly, Desert Basin, Northwest Basin, Coastal Basin, and the Eucla Basin.

The Ord River Area-East Kimberly, in the extreme northeastern part of the state, is made up of sediments and basalt flows and was thought to have been entirely of Cambrian Age, but recent work by the Mines Department has proved the presence of down-faulted blocks of Devonian and Permian sediments which extend into the Northern Territory and have yet to be examined for oil prospects.

Desert Basin Prospects

The Desert Basin, in the northern part of the state, has been the site of most of the drilling activity in Western Australia. Most of the geological work in this area has been confined to the northern portion of the basin, along the Fitzroy Valley. Recent mapping, suspended because of the war, proved that the Devonian outcrops are more extensive than previously thought or shown on geological maps. Above the Devonian, separated by an angular unconformity, is the Permo-Carboniferous series which apparently extends southwards, dipping at a low angle across the Desert Basin, over which only a few reconnaissance surveys have been made.

It will be observed that, with one exception, all the tests detailed on the accompanying map and in the table have been drilled in the northern section of this basin and have shown traces of oil.

Because of the war the two operating companies in Western Australia—Freney Kimberley Oil Company, Limited, and Caltex (Australia) Oil Development, Limited—suspended activity. Tentative preparations are now being made by Freney Kimberley Company to continue drilling at Nerrima, in the Desert Basin, while it is reported that the Caltex Company will shortly resume detailed mapping of the Fitzroy Valley and southwards.

Considerable geological reconnaissance has been done in the Northwest Basin, located in the central part of the western shore region, and also some detailed mapping in the Permo-Carboniferous portion. Although supposedly favorable structures have been found, no drilling for oil has yet been undertaken.

The Permo-Carboniferous deposits consist of limestones, sandstones and some shales, dipping at a low angle to the west, where they are overlain by Mesozoic deposits, and farther west by Vainozoic limestones and coastal sand dunes.

Up to the present, however, no oil seepages have been found, nor are there any indications of oil in tests drilled for water.

Coastal Basin

Although indications of oil have been reported from various localities in the Coastal Basin, situated on the south part of the shore, none has yet been accepted or confirmed by officials of the Mines Department.

The Eucla Basin, located in the southeastern part of Western Australia, is commonly known as the Bullarbor Plains. It is covered mainly by cavernous limestone of Miocene age underlain by shale and sandstone of Cretaceous age. Some tests for water have bottomed on granite.

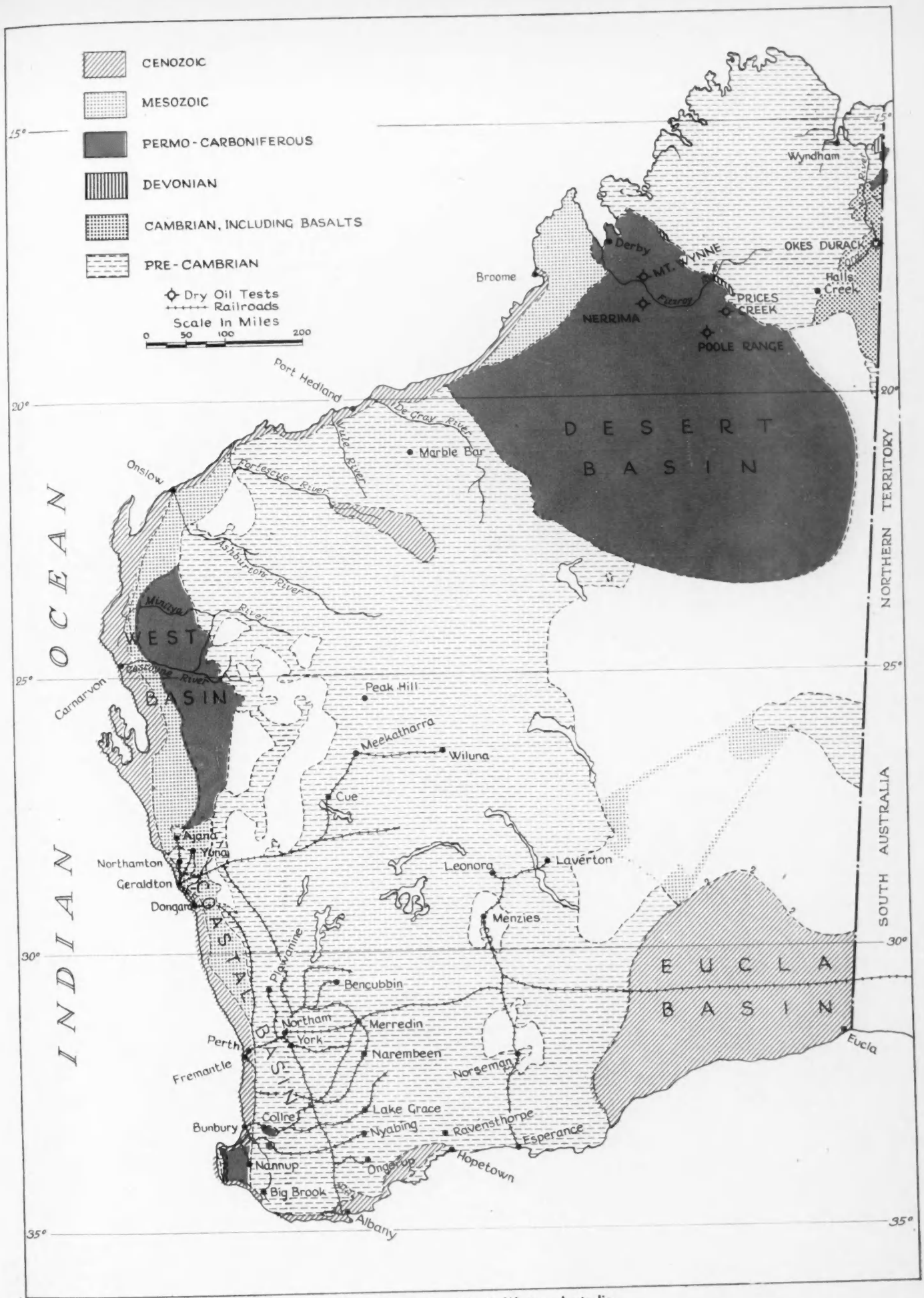
Although the beds dip at an average of five degrees to the south, no evidence of the presence of oil has yet been found. North of the Eucla Basin lies an indefinite area of Cretaceous age of which little is known.

Significant Information on Wildcats Drilled in Western Australia

Company, Well, Location	Year Completed	Total Depth (Feet)	Results
Price's Creek, 180 miles s.e. of Derby — Test No. 1	1921	1008	Traces of oil. Limestone of Lower Carboniferous age.
Test No. 2	or	345	Traces of oil. Limestone of Lower Carboniferous age.
Test No. 3	1922	809	Traces of oil. Limestone of Lower Carboniferous age.
Test No. 4		444	No trace of oil. Sandstones and shales, bottomed on limestone.
Okes-Durack Oil Co. test, 140 miles s.s.e. of Wyndham.	1924	1196	Limestones, mudstones and shales to 788', then basalt flows to bottom.
Freney Kimberley Oil Co., Ltd., Mt. Wynne test, 70 miles s.e. of Derby.	1925	2154	Globules of oil at various depths between 524' and 1886'. Bottomed in sandy shale.
Poole Range test, 170 miles s.s.e. of Derby.	1930	3264	Showed traces of oil, most promising between 2085' and 2115'. Mainly shales and sandstones. Hole abandoned due to loss of tools.
Nerrima No. 1 test, 100 miles s.s.e of Derby.	1941	4271	In Permian sediments, bottomed on medium to coarse-grained sandstones with some thin shale bands and coaly streaks. Operations suspended due to war conditions, tentative arrangements now being made to commence drilling again.

Natural Gas Prospecting Is Planned in Australia

The Zinc Corporation has applied for an oil-prospecting license over an area in the northeastern part of South Australia, on the New South Wales border, where natural gas containing 70 percent methane, has long been observed escaping from shallow holes. The corporation last year was granted an exploration license over 4000 square miles east of Lake Frome. If natural gas is discovered in sufficient volume, it is planned to pipe it for use as a fuel at the Broken Hill mines.



Geological and oil activity in Western Australia.

Mexico WELL COMPLETIONS

TABLE 1

Mexico's Well Completion Summary

Zone on Map	AREA	1932			1933			1934			1935			1936			1937			1938			1939		
		Oil	Dry	Total	Oil	Dry	Total	Oil	Dry	Total	Oil	Dry	Total	Oil	Dry	Total	Oil	Dry	Total	Oil	Dry	Total	Oil	Dry	Total
1	Lower California	..	..	..	..	2	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2	Chihuahua	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
3	Coahuila	..	..	..	..	..	..	..	..	..	..	1	1	..	1	1	..	1	1	..	..	..	..	..	..
4	Nuevo Leon	..	3	3	..	2	2	..	5	5	..	2	2	..	..	..	..	1	1	..	1	1	..	..	..
5	Northern Tamaulipas	1	1	2	1	4	5	1	1	2	1	3	4	2	3	5	3	2	5	2	1	3	..	..	..
6	Central Tamaulipas	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
7	Northern Fields:																								
	Southern Tamaulipas	..	..	..	..	..	..	..	3	3	1	4	5	4	8	12	1	10	11	2	5	7	..	1	1
	Tampico-Panuco Area	5	4	9	19	24	43	35	73	108	17	22	39	11	16	27	8	12	20	3	6	9	3	4	7
	Sub-total	5	4	9	19	24	43	35	76	111	18	26	44	15	24	39	9	22	31	5	11	16	3	5	8
8	Southern District:																								
	Ozulama-Tantoyuca Area	2	2	4	..	2	2	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Tempoal Area	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
	East Flank	4	1	5	..	..	..	..	..	..	..	..	..	..	1	1	2	2	4	..	..	..	..	..	..
	Western Group	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Tlacolula-Metlaltoyuca	..	..	..	..	..	..	..	..	..	1	..	1	..	1	1	..	..	..	..	..	..	..	..	..
	Main Belt (Golden Lane)	2	7	9	..	..	..	5	8	13	2	1	3	1	..	1	1	1	2	2	1	3	..	..	..
	Sub-total	8	10	18	..	2	2	5	9	14	3	2	5	1	2	3	3	3	6	2	1	3	..	1	1
9	Poza Rica Area:																								
	Poza Rica-San Miguel Mec	1	..	1	2	..	2	3	..	3	6	..	6	4	..	4	2	..	2	2	..	2	6	2	8
	Furbero-Papantla	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Veracrus Embayment	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..
10	Isthmus of Tehuantepec:																								
11	Saline Basin	15	8	23	32	7	39	11	2	13	10	5	15	8	1	9	9	1	10	3	6	9	6	2	8
12	Tabasco	..	1	1	..	1	1	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..
	Chiapas	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Sub-total	15	9	24	32	8	40	11	2	13	10	5	15	8	1	9	9	2	11	3	6	9	6	2	8
13	Oaxaca	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
14	Yucatan	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
15	Valley of Mexico	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Totals	30	28	58	54	42	96	53	93	148	38	40	78	30	31	61	26	31	57	14	20	34	15	10	25

Zone on Map	AREA	1940			1941			1942			1943			1944			1945			TOTAL ALL YEARS		
		Oil	Dry	Total	Oil	Dry	Total	Oil	Dry	Total	Oil	Dry	Total	Oil	Dry	Total	Oil	Dry	Total	Oil	Dry	Total
1	Lower California	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.....	3	3
2	Chihuahua	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	.....	4	4
3	Coahuila	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.....	22	22
4	Nuevo Leon	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	1	23	24
5	Northern Tamaulipas	3	3	6	1	..	1	2	..	2	..	1	1	..	..	..	3	..	3	*21	25	46
6	Central Tamaulipas	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.....	12	12
7	Northern Fields:																					
	Southern Tamaulipas	1	8	9	..	3	3	..	..	..	..	..	..	..	..	..	..	..	..	17	158	175
	Tampico-Panuco Area	1	10	11	3	5	8	1	8	9	1	6	7	2	9	11	4	18	22	1,613	2,615	4,228
	Sub-total	2	18	20	3	8	11	1	8	9	1	6	7	2	9	11	4	18	22	1,630	2,773	4,403
8	Southern District:																					
	Ozulama-Tantoyuca Area	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	49	52
	Tempoal Area	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.....	24	24
	East Flank	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	38	102	140
	Western Group	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	1	1	2	2	19	21
	Tlacolula-Metlaltoyuca	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	16	17
	Main Belt (Golden Lane)	..	..	..	..	..	..	..	2	2	..	2	2	..	..	..	..	..	..	527	530	1,057
	Sub-total	..	..	..	..	..	..	..	2	2	..	2	2	..	1	1	1	1	2	571	740	1,311
9	Poza Rica Area:																					
	Poza Rica-San Miguel Mec	7	1	8	4	1	5	3	..	3	4	..	4	6	..	6	9	1	10	63	12	75
	Furbero-Papantla	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	16	62	78
	Veracrus Embayment	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.....	3	3
10	Isthmus of Tehuantepec:																					
11	Saline Basin	7	3	10	7	5	12	..	2	2	2	..	2	12	3	15	11	6	17	378	287	665
12	Tabasco	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	2	8	28	36
	Chiapas	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5	19	24
	Sub-total	7	3	10	7	5	12	..	2	2	2	..	2	12	3	15	11	8	19	391	334	725
13	Oaxaca	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.....	6	6
14	Yucatan	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.....	6	6
15	Valley of Mexico	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.....	8	8
	Totals	19	25	44	15	14	29	6	12	18	7	9	16	20	13	33	29	29	58	2,693	4,033	6,726

* Gas production only.

(See Table 1 for map explanation.)

ALTHOUGH Mexico has been known as an "oil country" for many years, it is seldom realized how little actual drilling has been done in that Republic.

Of the surprisingly small total of 6726 wells drilled since the beginning of the oil industry in Mexico, it may be seen (Table 1) that more than 6200 wells have been drilled within the confines of the four producing areas of Tampico, Poza Rica, the Golden Lane, and Isthmus of Tehuantepec. Approximately 150 wells may be classed as wildcats in the sense that they were drilled well away from the known producing areas.

In face of these statistics, it is known that Petroleos Mexicanos, government-owned company, recognizes the need of increased wildcatting in order to tap new oil reserves. Recent reports indicate Pemex has about 30 geophysical and seismograph crews active.

On June 15, 1946, there were 14 rigs active in all of Mexico with seven classified as wildcat ventures.

Of the total of 23 completions (Table 2) made from January 1, 1946, to June 15, 1946, ten were oil wells and 13 dry holes. Most of the completions were confined to the Poza Rica and the Isthmus of Tehuantepec areas.

The possibilities for future exploration in Mexico may be better emphasized on an acreage per well drilled comparison basis. The United States, with an area of about 3,022,000 square miles, has had well over a million wells drilled. This is an average of more than one well to every three square miles.

Mexico, with an area of about 758,000 square miles, now averages about one well to every 1125 square miles—or a relative drilling intensity of one to 370.

Of the 14 current tests being drilled, 13 are being operated by Pemex. The other test is the Ohio-Mex Oil Corporation's Rancherias 9, in the Rancherias field, near Camargo, Tamaulipas. This test was last reported shut down for boiler repairs at 1215 feet.

Pemex has five field wells drilling in Poza Rica, two wildcat tests active in the Golden Lane area, five field wells in the Isthmus of Tehuantepec and three wildcat tests in northeastern Mexico. Two of the latter tests are located in the La Mision gas field near Reynosa.

Total crude oil production in Mexico at the end of 1945 was estimated at 2,212,320,000 barrels with almost half being produced in the Main Belt of the Golden Lane region.

Production in the northern fields, including the Tampico-Panuco area, has totaled approximately 774 million barrels. Poza Rica has produced about 236,200,000 barrels and the Saline Basin about 137,600 barrels.

Gas production in the Tamaulipas sector is estimated at 30 billion cubic feet.

TABLE 2
Mexico's Drilling Activity in 1946

AREA	WELLS COMPLETED January 1 to June 15			DRILLING, JUNE 15		
	Oil	Dry	Total	Drilling	S. D.	Total
Northern District	..	3	3	..	3	3
Southern District	..	4	4	2	..	2
Poza Rica	6	..	6	5	..	5
Isthmus of Tehuantepec	4	6	10	5	..	5
Northeastern	..	..	..	2	2	4
Totals	10	13	23	14	5	19

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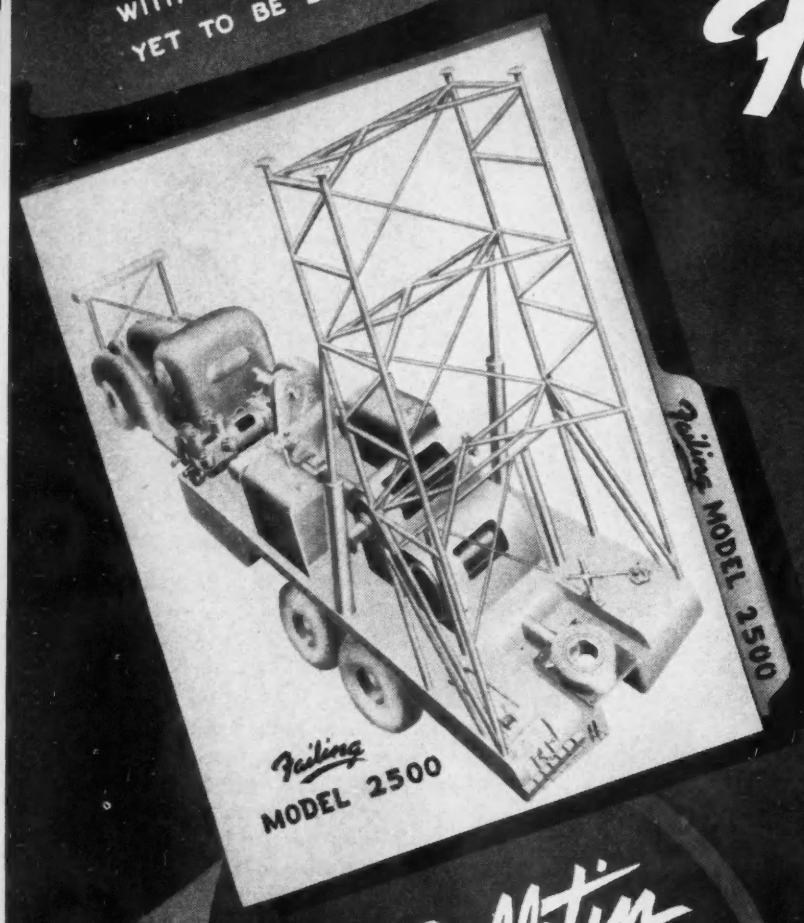

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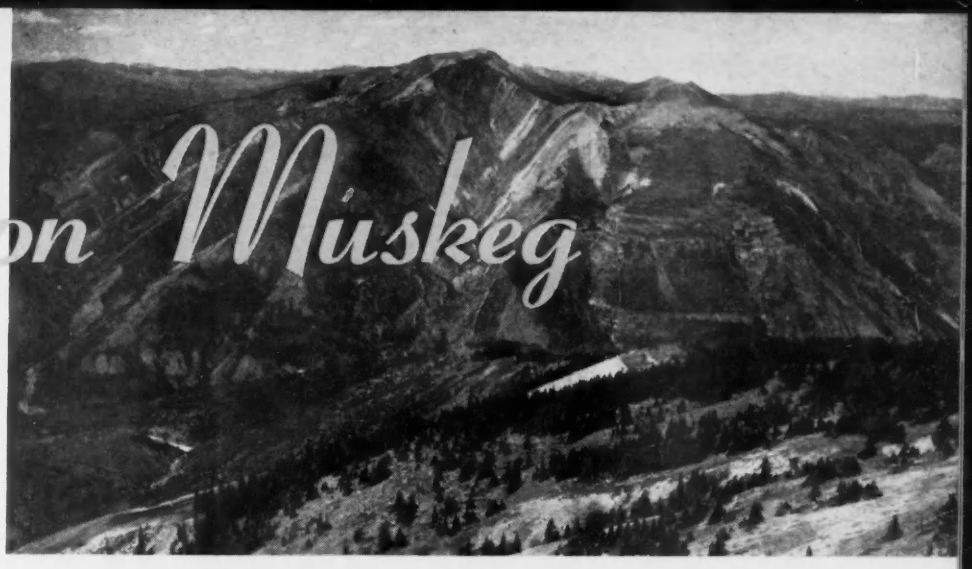
Operation Muskeg

By C. O. NICKLE, Staff Writer



Five major oil concerns have joined forces for what is expected to be the costliest oil exploration project in Alberta history. "Operation Muskeg," in the remote and rugged northerly Foothills, will cost well over $1 million before the first test is completed. This scene illustrates the type of structure and ruggedness of the area to be tested.
(Photos by Dr. Hugh Beach, McColl-Frontenac Oil Company)

"OPERATION Muskeg," believed to be the largest (in terms of cost) oil exploration project on a single structure in Alberta's history, will enter the drilling stage this fall. The project, expected to cost substantially over $1 million dollars before the first test is completed, is backed jointly by five major oil concerns, McColl-Frontenac Oil Company, Shell Oil Company of Canada, Imperial Oil, Ltd., Socony-Vacuum Exploration Company and Gulf Research & Development Company. The operation will test the Muskeg Anticline in the North Central Foothills, regarded as one of the most promising prospects in the Alberta Foothills Belt.

Imperial Oil, on the behalf of the Syndicate, has commenced construction of a 70-mile road from the town of Entrance, on the Edmonton-Jasper railway line, north and west to the well site, along the Muskeg River. The roadwork is expected to be completed about October 15. Heavy-duty rotary equipment will then be hauled in, and drilling commenced. The Madison limestone objective is looked for at about 10,000 feet. The exact well site, in unsurveyed territory, is not yet known.

"Operation Muskeg" had its beginning some three years ago, when geological parties of the backing major companies located and studied surface indications of structure along the Muskeg River, within the boundaries of the 1,244,000-acre "Smoky River Provincial Reserve," one of 14 tracts of oil and gas rights withdrawn from development by the Alberta Government in 1941. The area was further studied in 1944-45.

Costly Prospect

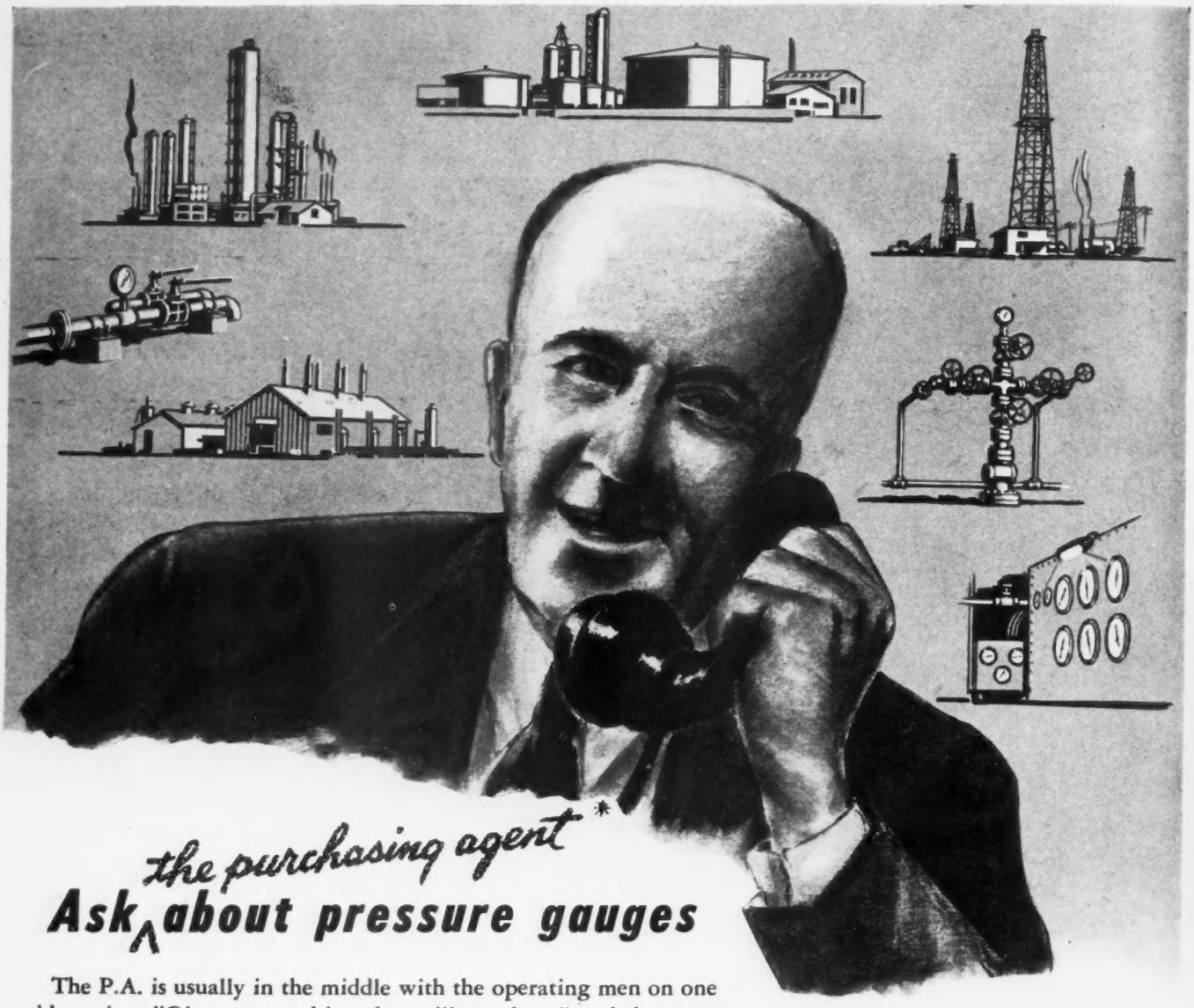
Remoteness of the indicated structure (205 miles west and north of Edmonton, 70 miles northwest of the nearest railway and highway; accessible only by saddle trail in heavily wooded, broken and muskeg-laden country), and the indicated up-to-two-mile depths to limestone, made it certain that testing of the area would be costly.

Five majors therefore joined forces. The Alberta government made the "Smoky River Reserve" rights available for sale by public tender January 4, 1946. Through McColl-Frontenac, the five majors took up a reservation on 207,000 acres, for the usual $250 fee, an unstated cash bonus, and a deposit of $70,000. Wasting no time in following up the geological work previously done, the team commenced a 78-mile winter tractor road within two weeks after securing the reservation, sent in a seismograph party about March 1, and completed a seismograph profile across the indicated structure on March 13—the party getting back to civilization just ahead of the spring thaw. Since then, the team has studied the seismograph data, correlated it with the geological information, and decided to proceed with development.

Site of "Operation Muskeg," the 207,000-acre reservation taken out by five major oil companies for their costly exploration project.

Location of Reservation

The 207,000-acre reservation takes in Twp. 56 Rges. 4 to 6w6, and Twps. 57 and 58, Rges. 5 to 7w6. Some idea of the size of the project is indicated by the fact that the team has spent in excess of $100,000 in work since acquiring the reservation, has reportedly set up a $1 million fund to provide for the coming road building and drilling of the initial well. What was spent by the participants in geological work before taking up the reservation is not known, but was undoubtedly a very substantial amount. The stakes in the gamble are large, but the prospects for success, and the hoped-for fruits of success are bright enough to make the gamble worth taking.



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Bolivia Oil Area Rugged

Bolivia's three producing oil fields (Bermejo, Camiri, Sanandita) are located in extremely rough terrain, as indicated by photographs on this page which show scenes from each of the fields. The producing area is in the extreme southeastern part of the country, in the eastern part of the main Andes Mountains.

Upper right: A drilling rig and flow tanks at Bermejo, which straddles the Bolivia-Argentina border.

Center: A scene in the Camiri field, showing how level spots have been dredged out of the mountain sides for flow tanks, buildings and roads.

Lower right: This mountainous drilling site is in the Sanandita field.

Oil In Colombia's Llanos Region

By GEORGE O. IVES, Staff Writer

PERHAPS the most important unknown factor confronting companies interested in Colombia's oil future has to do with the oil possibilities of the Llanos region. This is the most extensive single region in the several areas regarded as potential oil territory.

Physically and topographically, it is very similar to the extensive eastern Venezuela area which has become an important source of that country's production in recent years, and was originally looked upon with favor for that reason. Geological and geophysical work by practically all companies operating in Colombia have resulted in discovery of a number of structures, and bids have been filed for concessions totaling several million acres. However, little wildcatting has been done, due to the delays in approval of applications.

The big problem for development of the Llanos is one of transportation. It is a problem not only of transportation of any discovered and exploited production, but of materials and supplies with which to carry on normal development once oil is found in commercial quantities. Thus far the program of exploration is being carried on with full appreciation of the difficulties to be encountered in the event oil is found, but with an attitude of "first find the oil."

It has been estimated that for oil to be really commercial in the Llanos, a reserve of not less than 1 billion barrels must be found, and preferably more before it can be an economically sound operation. This figure was based largely upon the tremendous cost of constructing a pipe line to carry the oil across the Andes Mountains to a terminal on the seacoast, and estimates of such cost range upward from a minimum of $150 million for installation alone. It appears that the figure of a billion-barrel reserve must be reduced still further to terms of oil producible daily. Therefore, a company or companies must find a billion barrels of oil and be able to produce it at a rate of at least 100,000 barrels daily in order to recover the billion barrels within the 30-year period allowed for exploitation under the law. According to the present law it is possible to obtain a ten-year extension of the exploitation period at the option of the concessionaire, provided he agrees to pay the government such royalties and taxes as are in effect at the time of expiration of the original contract.

The Eastern Plains, or Llanos, is on the east side of the Eastern Cordillera of the Andes, drained by the tributaries of the Orinoco River, and covered for the most part with Pleistocene and Miocene deposits. It is along the Meta River, the principal tributary to the Orinoco, that most of the interest has been shown, and it is between this area and the foothills of the eastern range that the most likely petroleum possibilities are believed to lie. Exploration has not progressed as rapidly as it might due to the fact that between July and December the country is normally too wet for field work, and crews are removed from the area during this time. Parties are supplied by air with the lighter and more easily transportation necessities, but most equipment must come in from the coast by way of the Magdalena River to Puerto Salgar, thence by road to Bogota and on across the mountains to Villavicencio. There is only one road from Bogota to Villavicencio and this is none too dependable on account of frequent slides which block traffic. In mid-July a slide occurred on the road, taking out more than three kilometers of roadway and causing a delay of several weeks in highway traffic. During such periods it is necessary to charter extra planes for delivery of supplies to exploration and drilling camps. The road itself is so winding that at times it is necessary to unload long sections of pipe or drill collars and carry them around by hand to be reloaded on the truck which couldn't negotiate the curve with a long load.

To date, Shell Oil Company of Colombia has done all the actual drilling in the Llanos, having been engaged for several years in testing two concessions where no producers have been completed commercially, Tropical Oil Company is now moving in a heavy rig for a 12,000-foot test on the Meta River, and Shell is doing some preliminary survey work, preparing to move in yet another rig which will be set up on its Voragine concession near the two now being drilled.

On its San Martin concession, Shell is setting up a rig for San Martin 3, following abandonment of San Martin 2 at 6815 feet after it had been tested for sometime just above that depth. The operators had considerable mechanical trouble with the well, having had casing failures on two occasions and it is possible that some kind of a well could have been made here. It produced some oil which was very heavy, testing about 14 gravity, and which would have been almost impossible to transport through a pipe line at the altitudes it would have to reach. The first well on the concession was drilled with a light rig, and a medium duty power rig was later moved in for the second well. The Chafurray concession, about 125 kilometers to the southeast of San Martin, has also yielded some showings, but in a lesser degree, there having been some sands found in Chafurray 5, now drilling below 1500 feet, that carried heavy oil, described as tar sands. The four previous wells were dry holes, and averaged about 2500 feet deep. This prospect, as well as the San Martin prospect is a seismograph picture.

Any final attempt at evaluation of the Eastern Plains as oil territory will have to await more drilling, and drilling over a wider area than has yet been covered. The Shell wells have all been in the extreme southwestern part of this vast area and constitute only a minute fraction of the region. Further drilling will be done as concessions become available, but thus far Shell, Tropical, and Richmond Petroleum Company are the only ones who own actual contracted acreage. Approval of applications are a slow and lengthy process, and the prospect of a line built by a combination of companies is not too good under these conditions. One company would be forced into its commercial phase while others might still be awaiting approval of contracts for their first exploratory drilling.

A Seismologist In Venezuela

Camp pets are popular with Seisdel crewmen. Here, a couple of parrots pose on the barrel of the rifle which will soon bring fresh meat to the table.

By L. F. IVANHOE, Computer Seismograph Service Corporation of Delaware

To THE American who has been assigned an oil industry job in Venezuela or any other South American country, Caracas is an ideal jumping-off place into the interior. It gives him an opportunity to orient himself and to become somewhat acquainted with the people and customs of the Latins. Because of its strategic location in relation to operating airlines, this city is the gateway through which passes most of the personnel destined for work in exploration or active exploitation in the rapidly expanding oil fields of Venezuela and Colombia, as well as in other countries.

There is an activity and bustle about Caracas that appeals to the American. In general aspect it differs little from the average capital of other Latin-American countries with its narrow streets, stucco-tiled buildings and old-fashioned venetian blinds and windows; its rows of monotonously similar residences which extend as far as the commercial sections but which are relieved of tedium by their beautiful patios, once the visitor penetrates the heavy, forbidding front doors. One can see that the automobile was far from the minds of the city planners when the town was first laid out, and sedate carriages drawn by spanking pairs spring to mind as one walks the streets.

Gradually, Caracans are beginning to appreciate the significance of the activities of American oil companies in their country and there is always a warm welcome for the itinerant oil man from the states. Venezuelans as a whole are proud of the record which their country is establishing and it is easy to see that the benefits derived from the development of the country's vast oil resources are being felt more and more at all economic levels. On the whole, a very cordial relationship has sprung up between Venezuelans and Americans and this is particularly true in Caracas where Americans go to and from the fields regularly.

Charming Caracas

Despite its narrow, winding streets, the city has considerable charm. To the American, it has novelty; to the field man who has spent many months in the mountains and jungles of Venezuela, it has glamor. Because of its location, it is the mecca for leaves and has all the attractions to the entertainment-starved American that are to be found in any fairly large American city.

Caracans appear to be better dressed than the average Latin-American city dweller. On the whole they must be well paid to be able to afford the prices asked by clothing stores and tailors. A two-piece, ready-made suit costs about $75, while shoes of good quality are priced from $12 to $18 a pair. On certain items it is easy to see that the country has been hit by inflation. Rents, especially, are much higher than in the U. S. under OPA. Furnished houses can be had for from $150 to $200 a month, while a three-room apartment in town rents for $400 a month. Americans assigned to Caracas and who plan to remain a year or more, generally rent an unfurnished house for about $75 a month and buy a few hundred dollars worth of furniture which can be sold when they leave the city. Household help is plentiful and good, and wages are not too high when measured in standards applying back home.

Although prices are higher than in the states, there appear to be little or no shortages in the stores, which are well stocked with jewelry, clothing, household appliances including radios, electric refrigerators, furniture, etc., and the stores are always crowded. American manufacturers apparently are supplying their foreign markets more liberally than at home. One importer explained that Americans have adopted this policy in order to retain markets which might otherwise be taken by foreign competitors. However, there are no new automobiles on the streets, and the taxis and buses which provide most of the city's transportation are in poor condition and terribly overcrowded. During the rush periods it is difficult to get a place on a bus and queues form at every stop.

Fun-Loving City

Like most Latin-Americans, Caracans are fond of good food and drink and there are many excellent restaurants throughout the city where a variety of native and American dishes are on the menu. Fruit is always plentiful and the country brews an especially good beer which, with imported Scotch whiskies, have proved popular with Americans. There are good night clubs in Caracas with talented bands ready to give out with jazz or classical music to suit the clients. A novelty of Caracas night club life is the community singing encouraged by the hostess singers and along about midnight patrons are generally in good voice and the singing continues until closing time. Most popular night club with Americans is "Johnny's," while the American Club is the general meet-

Firing a seismic "shot."

Residences in Caracas may be monotonously similar from the outside but the patio is a riot of color and bloom.

ing place for those who live in the city or who are passing through or on leave.

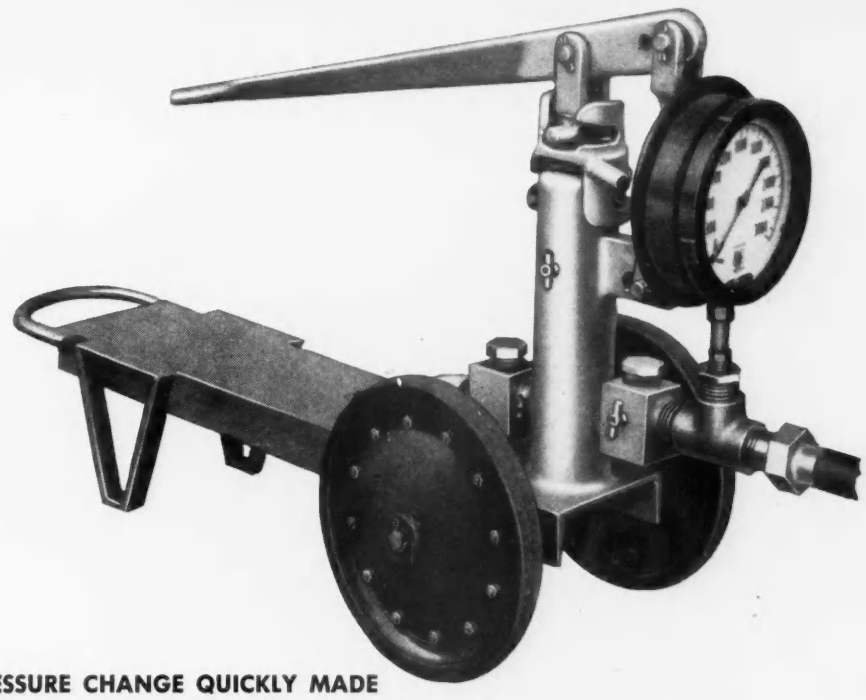
Caracans have recognized the American desire for books and especially magazines and newspapers from home and there are many small book stores well stocked with pocket-size volumes, pulp paper thrillers and current magazines which are bought up by the armful by those headed for the interior. *Time* and *Newsweek* have air express editions which are on Caracas newsstands just about the same time they are available back home.

Visitors to other large Latin-American cities note the great construction activity going on and Caracas is having a building boom of its own. There is no doubt that the city is undergoing a modern face lifting, and since building materials are available in quantity from native resources, the boom is likely to continue for some time to come. Much new construction is replacing the old Spanish colonial type of architecture with modern, concrete, steel-reinforced, fireproof edifices in the commercial districts. Fortunately for Caracas, new residences still conform to that pattern which catches the eye of the visitor and marks every Latin-American city with quaint charm and color. Residents love flowers and take full advantage of the mild climate which makes their cultivation a real pleasure. The city is noted for its profuse growth of bougainvillea, while the patios are gay with many colored flowers, artificial ponds and palm fronds.

Red Tape Abundant

Our State Department should take steps to cut the red tape which hampers the movements of American personnel assigned to the interior of Venezuela. An American passport and a visé are sufficient to get to Caracas; but to leave the city on business which entails an extended stay in the country is something else. Before leaving for the field it is necessary to have one's personal papers in order and most American companies operating in the country must have a representative who knows the ropes and who can steer the newcomer through a maze of legal red tape.

The author's company, Seisdel, maintains such a representative who takes the newly arrived crewman to the Civil Identification Bureau where he is photographed, fingerprinted, etc., and is issued a "cedula" or identification card. Next he must go to the Registry of Foreigners office where he must fill out a number of complicated forms, is again fingerprinted and must present his American passport to be stamped. When these formalities have been complied with he is issued a permit to travel through the country. Delays are inconvenient and costly to companies and



PRESSURE CHANGE QUICKLY MADE

With the handle at the bottom of the down stroke, the pressure shifter is disengaged from lugs on the cylinder body and the pump is ready to operate using the low-pressure (large diameter) piston; by moving the pressure shifter to engage the lugs, the smaller diameter, high-pressure piston is placed in service.

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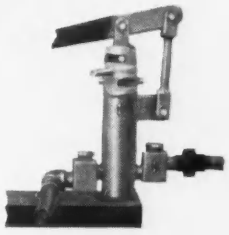
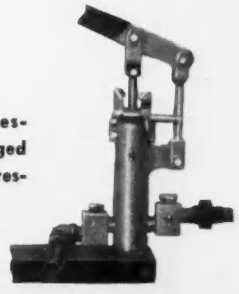


With pressure shifter disengaged, pump is ready for low-pressure operation.



With lugs and pressure shifter engaged to provide high-pressure service.

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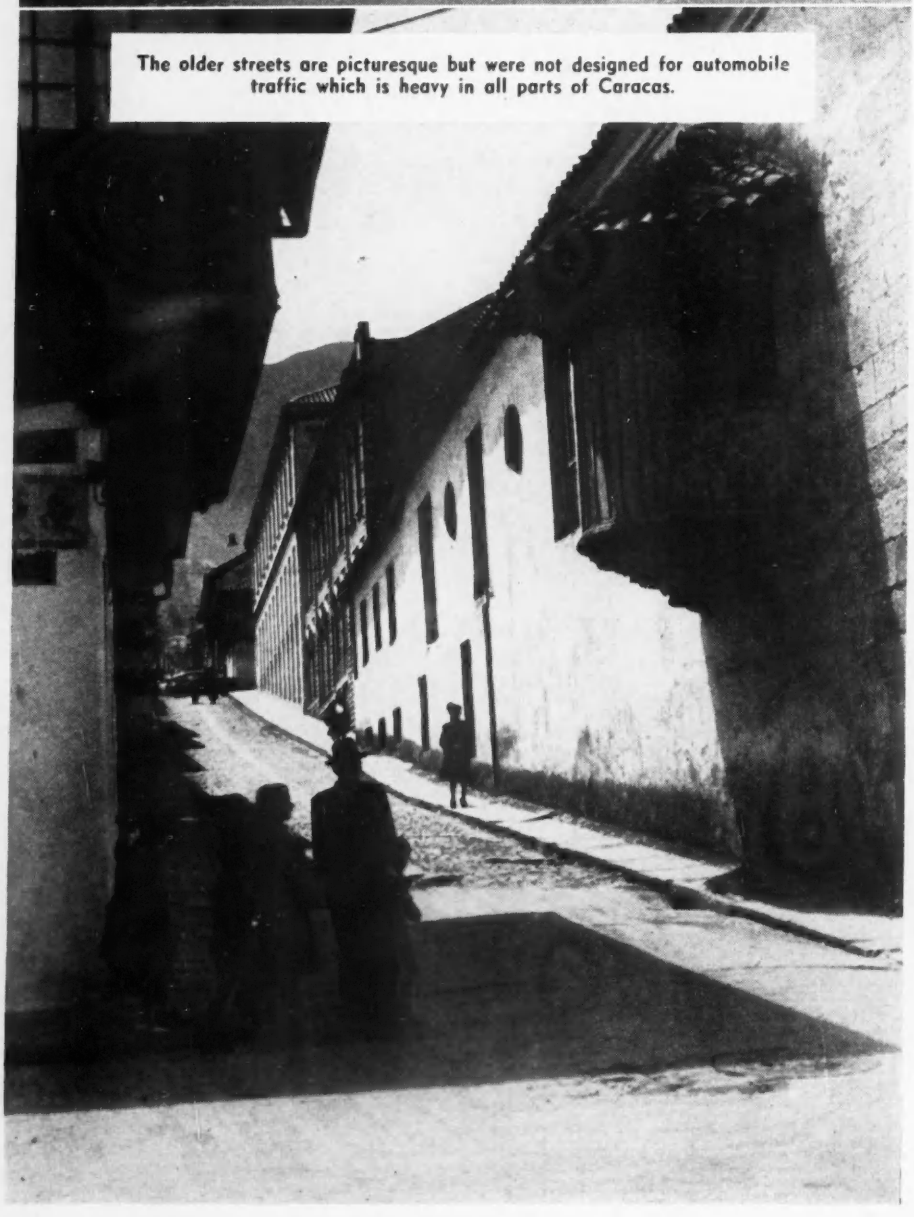
Good mountain roads between Caracas and San Juan de los Moros permit this Seisdel recording truck and trailer to make good time. Roads are not so good beyond the mountains and into the Orinoco Basin, where ten camps are scattered over a wide area which is undergoing intensive geophysical survey.



The older streets are picturesque but were not designed for automobile traffic which is heavy in all parts of Caracas.

personnel and the average American who wants to get about the business of finding and producing Venezuela's oil feels that the procedure, unnecessary back home, is equally unnecessary in a friendly country. Perhaps something can be done about it and the simplest way would be for the Venezuelan government to accept an American passport as a satisfactory credential for all purposes.

Most of the geophysical work being done by Seisdel is in the region of the Coastal range of mountains and north of the Rio Orinoco where about ten crews are exploring approximately 90,000 square miles. On arrival in Venezuela the writer was assigned to crew No. 10, then stationed near the town of El Sombrero in the state of Guarico, about 90 miles south of Caracas. That first trip from the city to the station was quite an experience and was marked by novelty, humor and considerable inconvenience, especially when the private automobile which made the first leg of the journey was replaced by one of the native buses which cover the country and are found in the most unlikely places. The first leg of the trip was over a good road which wound through the mountains and afforded some splendid scenery. Passing the divide and starting down the valley into the Orinoco slope, one saw a magnificent view of majestic mountain ranges stretching ahead for miles. The terrain is rugged, poorly cultivated, and sparsely populated. Beyond the mountains lies San Juan de los Moros, a fairly large town where American refrigerators seem to have caught the fancy of the townsmen, for one sees them in practically every house, even in the smaller mud huts. On the trip to San Juan there are several roadhouse-restaurants fairly well stocked with Coca Cola and American canned goods as well as native fruits, while small boys carry on a brisk trade in avocados and oranges neatly packaged in small net bags. San Juan is noted for its medicinal hot springs, said to be excellent for "what ails you" and Caracans have converted it into a miniature spa. This, in part, accounts for the fairly good road.

Riding a bus in the interior of Venezuela is quite an experience. The drivers are dexterous and obliging. Dexterity is a prerequisite because of the many cows, pigs, chickens, burros and slow-footed pedestrians who insist on traveling in the middle of the highways. Night driving is especially hazardous, since cattle seek the warmth of the highways to bed down. Buses are crowded to an alarming extent and the driver insists that "there is always room for one more." No time schedules are observed and buses reach their destination at all hours. All along the line passengers,

with their animals, are picked up and shoved into the vehicle and it is quite common for a bus to reach its terminal with goats, chickens and hogs in about the same proportion as the paying customers. Although the Seisdel camp was only 90 miles south of Caracas it took the writer about eight hours to reach his destination. However, no one can kick about the fare as the bus trip cost only $1.50.

Country in which Seisdel crews are engaged in geophysical prospecting resembles the western plains and prairies of the United States. There is little vegetation other than prairie and buffalo grass and the country is given over to cattle. Grazing is good and animals thrive on the range.

Self-Sufficiency Necessary

Seisdel crews must be self-sufficient and be able to build roads, feed and house an average crew of 100, provide medical care, decide legal problems and carry sufficient money at all times to pay laborers in cash. They must be prepared to haul and store gasoline and supplies for all trucks and equipment, repair and maintain all machinery from drill to electric light plant, in addition to the usual duties of surveying, drilling, shooting, recording and computing. Thus, it can be seen that a seismologist in Venezuela must also be a jack-of-all-trades and capable of operating under conditions undreamed of in the oil regions of the U. S.

Each crew is in the nature of a self-contained village with the party chief responsible not only for seeing that all local laws are obeyed, but also that all supplies are ordered on time and not wasted; that food, shelter, and water for drinking and cooking and bathing purposes are provided. He is further responsible for the general good health and spirits of his men. At times the party chief may be the only American on the crew, but generally there are a half dozen English-speaking members of the technical staff, roughly equivalent to a normal crew in the states.

Ingenuity must be employed continually in meeting daily problems. For example, if a truck breaks down there is no question of towing it to a garage; it must be repaired on the spot with whatever materials and equipment are at hand. Thus, all breakdowns of whatever nature must be anticipated in advance and sufficient spare parts kept on hand to meet all situations. Spare parts must reach the camps from Caracas and this generally entails a delay of two weeks or longer. The same applies to food supplies, gasoline, office supplies, medicines, etc. Few people live in the general area and only the bare necessities of life are available.

Camps conform generally to an accepted pattern. There is a tent for the computing office, one for the cashier-lawyer, a hospital tent, a recorder's tent, drillers' tent, garage tent, laundry tent, and a large mess-club tent. Tents consist of tarpaulins which, when supported over drill pipe, are about nine feet high and some 25 feet square. The mess-club tent is larger, about 70 feet long. Windbreaks are constructed of palm leaves over bamboo frames. Besides these work-tents, each technical member of the crew has his own individual tent with a bed, tables, chair, lights and mosquito netting.

Sanitation is primitive but effective, with outlying privies and oil drum showers; also wash basins, pitchers and mirrors. A tent boy takes care of the tents and washing facilities. The native tent boy, the cook and laundry men rate a tent, but the native laborers live some distance away in a camp of their own where they are furnished large tarp-tents and cooking utensils.

Seisdel camps are efficient and practical, since they are supplied with all the necessities for a sustained exploratory program without being too cumbersome to manage or too difficult to transport. Camps are laid out with careful attention to the relationship of component parts. First a suitable camp-site is chosen and then the camp itself is set up with the technical section upwind from the rest of the layout to insure a minimum of noise, dust and odors. All tents are arranged for convenience and comfort and supplied with a generating plant which provides lights and refrigeration. Everything is provided with the exception of personal items such as clothing, tobacco, etc. Books and magazines are supplied regularly and some of the older crews have assembled small libraries. Wherever practical, grass is trimmed and tree trunks white-washed in an attempt at beautification of the camp-site.

Recreational facilities are necessarily limited, but in certain areas where game is plentiful crews organize hunting parties and vary the camp menu with venison and wild duck. Fishing is rare, although in some regions it is possible to fish with dynamite. Baseball is popular and is played by both Americans and natives, while other practical sports requiring little equipment, such as badminton, help the recreational needs of the crews. Reading, of course, is universal and there is time to do many of those things that one would like to do back home but continually puts off.

Leaves into Caracas and other interesting places are systematically arranged for field men who are given a week's local leave every three months to enjoy a change, attend to personal business or just to blow off steam. However, many of the men pass up leave, preferring to remain in camp, and it is not uncommon to meet crewmen who have remained in the field for months without making a trip into Caracas or to other centers.

Good Food

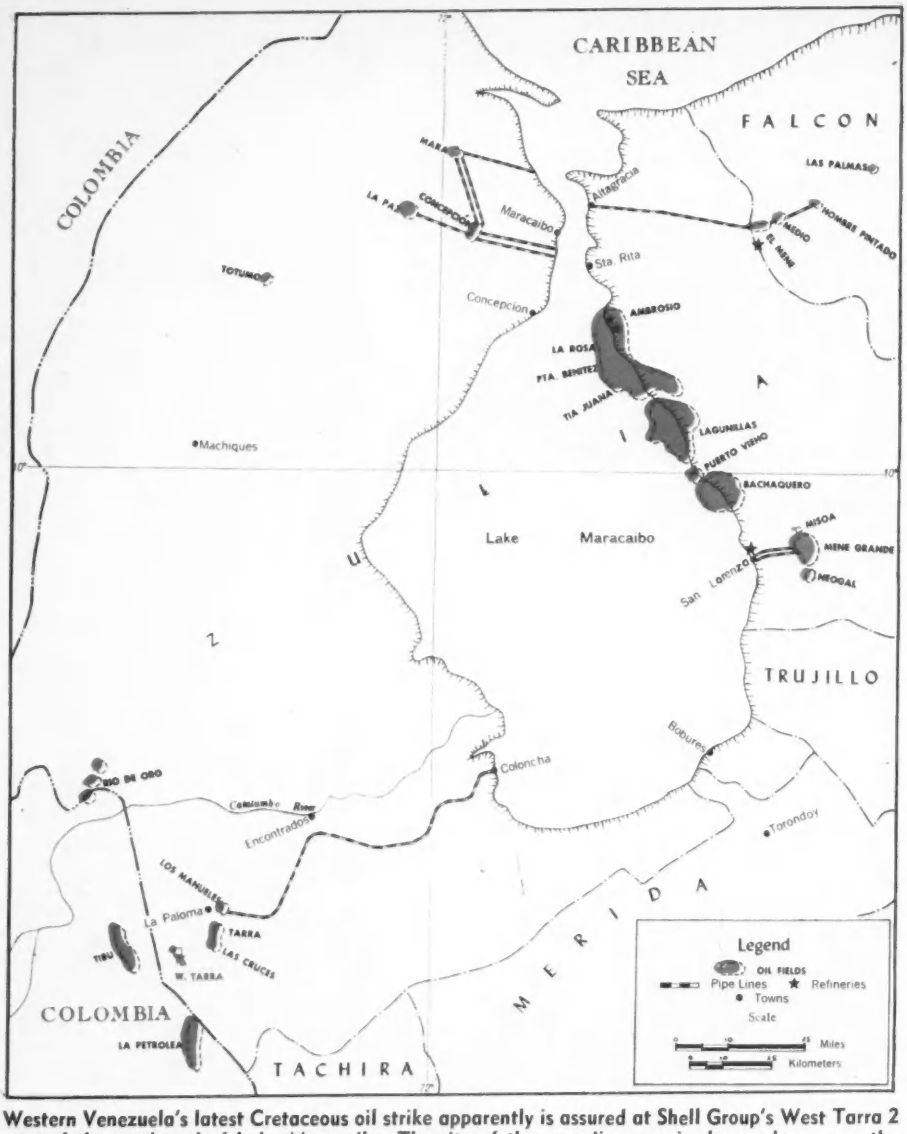
Food in the camps is the best procurable and suited, as far as possible, to individual taste. Many of the cooks are Chinese. Individual tastes are more apparent at breakfast when a man has his choice of anything from fruit juice, toast, breakfast food and eggs, to any kind of prepared meats, tamales, sardines, steaks, onions or whatever else strikes the fancy. Stoves consist of modern gasoline ranges and camps provide their own bread and pastries. Large pitchers of iced tea and lemonade are always available. Supplies are brought in from Caracas and there is always two or three weeks' supply on hand to carry crews through any emergencies.

Pets are popular in Seisdel camps and include tame deer, parrots, hawks, pheasants, dogs and even pigs. Parrots and deer have peculiar appetites and seem to enjoy eating bars of soap, shaving cream, and even shirts. Monkeys are also popular around camp and crewmen must keep a sharp lookout for snakes.

The weather, generally, is pleasant with nights usually cool. Light clothing is comfortable during the day with low shoes and slippers generally worn around the camp. T-shirts are practical for the field, since they can be easily laundered. Short-sleeved shirts and trunks are customary but few hats are worn. Sweaters and jackets are unnecessary, since it seldom gets cold enough to use them, but a rain-jacket of the oiled silk type is handy as are raincoats of the same type and weight.

Considering the circumstances and conditions under which he works, a seismologist in Venezuela could do much worse, even in the states. The pay is good and affords an excellent opportunity for laying away a sizeable nest egg. The experience is invaluable and the life he leads develops characteristics which will materially assist him in later life. Camp life is pleasant and comfortable and associations are built on foundations which must lead to lasting, life-long friendships. Newcomers usually require a period of readjustment but soon get into the swing of things.

A fine spirit prevails in Seisdel camps where crews appreciate the significance of the work they are doing. They realize that they are the vanguard of a steadily increasing influx of technicians and others who are steadily developing the vast petroleum resources of Venezuela.



Western Venezuela's latest Cretaceous oil strike apparently is assured at Shell Group's West Tarra 2 west of the south end of Lake Maracaibo. The site of the new discovery is shown above near the Colombian border.

Shell Opens Field In Western Venezuela

THE discovery of new Cretaceous oil production in Western Venezuela apparently is assured in the Shell Group's West Tarra 2, wildcat west of the south end of Lake Maracaibo, and near the Colombian border.

This wildcat has resumed drilling after a drill-stem test in the upper part of the Cretaceous limestone showed more than enough oil to assure commercial production. After going into the limestone at a depth of about 7000 feet, the West Tarra 2 made a drill-stem test in the upper 40 feet of the formation, using ½-inch chokes. The well started flowing almost immediately, and tool was left open for 45 minutes. On the basis of flow during this time, production was estimated at 2000 barrels of 42-gravity oil daily.

No specific objective depth has been set by the company, since the plan probably will be to drill through the section into the basement rock for a thorough test of the formation. Apparently the producing formation has the same general characteristics as the limestone from which the new production northwest of the lake is coming, and this discovery is regarded as highly important to the future of extreme Western Venezuela.

Location for this wildcat is on a separate structure, west of the feature known as the Tarra Ridge, on which are located the Las Manueles, Tarra and Las Cruces fields. The Tarra Ridge structural feature, an elongated anticlinal feature on which most of the production is controlled by faulting, has been productive for nearly 20 years, having been opened in 1927, and produces from sand pay formation in the Eocene. It has produced upwards of 95 million barrels of crude, and the three fields together were making 17,000 barrels daily at the end of 1945. The new area is anticlinal in nature, but as far as is known now, it has no pronounced faulting. Apparently it is structurally very much like the Tibu structure on the Barco concession in Colombia, which is only about five kilometers (3.1 miles) west. Actual extent is not indicated, and any reasonable estimates will have to wait for further drilling.

Discovery of the area is credited partly to surface geology and partly to geophysical work which followed the field geological work. Rapid development of the area, if productive, is not expected immediately, since it is in difficult country in which to operate, having in additional to the natural jungle and mountain features with which it would have to contend, the additional problem of being in Indian country, an area inhabited by the Motilon Indians with whom civilization has not thus far been able to make any contact of friendly nature.

Wildcatting Stimulus

Establishment of production here comparable to the production from this formation in the La Paz and Mara areas to the north would act as a pronounced stimulus to exploratory work west of Lake Maracaibo, since it has been shown by some drilling that the Cretaceous limestone does not underly the Eocene in a blanket throughout the region, and this new well is definite proof that it does not exist only in the region farther to the north. It is the second important indication of the prolific Cretaceous production in Venezuela.

In one other point where it has been found—in the central Venezuelan region—results were not nearly so encouraging as the two strikes in the west. In this statement the two fields at La Paz and Mara are treated as one from a regional standpoint, although they are on separate structures. Between the La Paz-Mara area and the West Tarra area, lie many millions of acres, most of which are virtually unexplored, although an extensive geophysical and drilling campaign is under way by Richmond Petroleum Company just south of the northern productive area, and just west of Lake Maracaibo. Most of this acreage is still open.

A List of War Requirements Manufactured by Reed Roller Bit Company During the War

M4 Tank Transmissions and Final Drives

155 MM Shells

75 MM Gun Tubes

81 MM Mortar Projectiles

Anti-Submarine Shells

Engine Mounts for A-24 Dive Bombers

B-24 Landing Gear Shock Absorbers

A-20 Landing Gear Shock Absorbers

AT-10 Landing Gear Shock Absorbers

AT-11 Landing Gear Shock Absorbers

Other Miscellaneous Airplane Parts

Regular Reed Products

REED ROCK BITS

REED TOOL JOINTS

REED *Kor-King* CORE DRILLS

REED *Wire Line* CORE DRILLS

REED DRILL COLLARS

REED REAMERS

REED HOLE OPENING BITS

REED FISHTAIL BITS

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Oil IN THE U.S. FOREIGN POLICY

By JOHN A. LOFTUS

Chief, Petroleum Division,

U. S. Department of State

ACTIVITIES of the United States government with respect to foreign oil operations prior to World War II fall under one of these four heads:

1. Insistence upon nondiscriminatory commercial treatment of American oil marketers operating in foreign countries.

2. Insistence upon the "open door" principle of equal commercial opportunities (most-favored-nation treatment) with respect to the granting of rights to explore for and develop oil reserves.

3. Insistence on the principle of just and adequate compensation in circumstances where a foreign government exercises its sovereign right to nationalize the oil industry.

4. Diplomatic assistance to and support of American oil companies in their various dealings with foreign governments, when requested, such assistance and support being more or less routine, depending upon the circumstances.

All four of these points, however, are basic concepts in the foreign commercial policy of the United States. There is nothing in them peculiar to oil. With respect to any industry or any American commercial operation abroad we insist upon nondiscriminatory most-favored-nation treatment (the "open door") and just and adequate compensation, and the government, upon request, renders to American commercial interests without discrimination or favoritism whatever measure of diplomatic assistance or support is necessary or appropriate under the particular circumstances.

In this sense then, we have not had until now a foreign oil policy in any way significantly different from, larger than, or more concrete than our foreign commercial policy generally. If there was at certain times greater emphasis upon the application of these principles to oil than upon their application to other commodities, it was attributable primarily to the large importance of oil in the total volume of United States foreign investments and, in some slight degree, to a recognition of the strategic importance of oil. This latter recognition, however, was tempered by a soothing awareness of apparently unlimited oil resources available within the United States.

(This is a portion of an address delivered by Loftus at the University of Pittsburgh, July 30).

Present Policy

So much for the past. As of today what is the foreign oil policy of the United States? As I see it there are three aspects to foreign oil policy. In the first place, there is the specific application to oil of our general commercial policy. In the second place, there is what might be called our "national" oil policy—the things with reference to oil that we want to accomplish in our own strict national interest. Finally, there is what might be called international oil policy—the things with respect to oil that we and other nations individually and collectively want to accomplish in order to minimize the conflict and instability that oil can generate and in order to ensure that oil will contribute to peace and prosperity rather than inhibit their attainment.

We shall continue to press for the same objectives—nondiscrimination, equality of opportunity, fair treatment. Beyond this, however, we also assume that oil will find its place in that pattern of expanding and liberalized international trade which the United States government seeks to attain by intergovernmental consultation and collaboration. Such a pattern of world trade is the end-object of the United States "Proposals for the Expansion of World Trade and Employment." The mechanisms of collaborative action which we hope the nations of the world will undertake are described in those proposals. They include the elimination or reduction of restrictions upon trade imposed by governments, such as tariffs, preferences, quotas, miscellaneous import and export prohibitions or restrictions, export subsidies, discriminatory exchange controls, and discriminatory treatment on the part of state trading enterprises. They include also the elimination of restrictions imposed by private combines and cartels, such as combinations or agreements to fix prices and terms of sale, divide markets or territories, limit production or exports, suppress technology or invention, exclude enterprises from particular fields or boycott or discriminate against particular firms. They also include the elimination or mitigation of that disorder in the markets for certain primary commodities which results from the existence of burdensome surpluses accompanied by widespread distress to many small producers; this object is to be effected by the negotiation, where appropriate, of intergovernmental commodity agreements designed to prevent or alleviate economic dislocations and so remedy, if possible, their root causes. Finally, our program calls for the elimination of those violent fluctuations in economic activity and prosperity which result from the inability of nations to maintain high and stable levels of employment and production. If these collaborative measures are firmly and boldly espoused, the pattern of world trade in oil will perhaps be modified somewhat but its volume will be increased and its contribution to the prosperity of nations and to a general increase in levels of living will be enhanced.

National Policy

Such, in too brief a summary, is our commercial policy in its application to oil. What is our national oil policy? A policy is, I think, essentially a coherent answer to these three questions: (1)

What is the situation that confronts us? (2) What are the objectives that we must attain? (3) What are the main lines of action by which they can be attained?

The situation that confronts us is one wherein foreign oil supplies assume an unprecedented importance. It is almost a new experience for the United States to have to worry about the oil that might be needed in peace or war for essential requirements of the nation. As I indicated earlier, in the earlier '20's there was much agitated discussion of our dwindling oil reserves and of our imminent dependence upon foreign sources of supply. This period of alarm was short-lived and few remember it. The alarm, it so happens, was ill-founded as the subsequent wave of sensational discoveries disclosed. Except for that short period the oil economy of the United States was one of abundance, indeed of surplus. There are serious indications that such is no longer the case and we cannot in good conscience close our eyes to these signs.

I do not propose to become engaged in a statistical controversy. I shall not attempt to tell you exactly how many years supply of petroleum remain in the United States—principally because I do not know (and no one can know with certainty) what additional quantities of underground oil we shall discover. I shall not attempt either to tell you how many millions of barrels of oil per day we shall be importing in 1965. Again I do not know. But some things I do know:

1. In the opinion of the best market experts and petroleum economists the demand for petroleum products in the United States will increase steadily over the next 20 years and will by general consensus reach a level of approximately 6½ million barrels a day in 1965.

2. The productive capacity of presently known oil reserves, if produced at maximum efficient rates, will decline over the next 20 years to a level materially below 3 million barrels per day.

3. The total productive capacity of the United States will be higher than the MER productive capacity of presently known fields only by the MER productive capacity of such new fields as may be discovered.

4. If the trend of discoveries that characterized the period from the end of 1938 through 1945 is continued substantially unchanged, the size and productive capacity of the new fields that will be discovered in the next 20 years will permit an additional MER productive capacity that will bring total MER capacity in 1965 to a level of not over 3½ million barrels per day.

5. The only circumstances that could produce a materially different result would be another wave of sensational discoveries of large new fields.

6. There are no presently known geological considerations justifying strong affirmative assumption that such a wave of discoveries is probable.

I do not rashly draw gloomy conclusions. I do not say that we cannot bring in another East Texas. I do not say that we shall necessarily have a deficit of 3 million barrels per day by 1965. I do say that, on the basis of presently known facts, there is serious indication that *if* consumption increases at the rate foreseen by the best petroleum economists and *if* the discovery rate that characterized the last 7 years is not greatly surpassed, then within a few years we shall of necessity be as a nation a significant net importer of petroleum. Either or both of these if's may be invalidated by future events — but there is no present evidence affirmatively suggesting that they will be. The only conclusion which I draw is that we are obligated in prudence to consider the possibility of substantial dependence upon external sources of supply and therefore to consider the measures which we should take to ensure the availability of foreign supplies.

Measures Suggested

The measures which we should take would be directed toward the following ends:

1. To promote the development of those sources of supply (primarily in the Western Hemisphere) which are well located from our point of view—that is, economically located under circumstances of peace and strategically located under circumstances of war.

2. To encourage and facilitate within reason the participation of American capital and enterprise in the development of such sources of supply—not merely because of the readier access which such participation would guarantee to us but also because on the record the technical and managerial skill of the American petroleum industry is preeminently competent to ensure the prompt and efficient development of resources anywhere.

3. To promote the development of oil potentialities in the Eastern Hemisphere, particularly in the oil-rich areas of the Middle East—so that the expanding requirements of Europe and Asia for petroleum products can be met from Eastern Hemisphere production without that drain upon Western Hemisphere reserves which has characterized the pattern of world oil trade in the past.

4. To facilitate and encourage within reason the participation of American capital and enterprise in the development of Eastern Hemisphere resources.

These are the main objectives which from the point of view of our own national well-being we should seek to attain. The mechanisms by which we can further their attainment are too numerous to list in detail but include such things as:

1. Promotion of a generally stable political and economic environment.

2. Encouraging the emergence of sound conditions of basic law and of contract so that oil industry operations abroad can be conducted in an atmosphere of reasonable political tranquility.

3. Promotion worldwide of conditions of expanding trade upon liberal principles and in stable convertible currencies so that an adequate commercial incentive will be provided for the development of known oil potentialities.

4. Promotion of free and flexible competition in the international oil trade so that supplies from abroad may be available to meet the needs of the United States and to supplement our indigenous productive capacity.

5. Promotion of fair and mutually beneficial contractual relations between American oil companies and the governments of those countries whose oil resources are being developed so that (a) the investment position of American companies will be solidly based; (b) it will promote good intergovernmental relations; and (c) the commercial operations of American companies are conducted always in such manner as to foster the economic advancement and to raise the standard of living of the people within whose territory the oil is found.

6. Elimination of political and commercial restrictions upon the free competitive development of oil resources wherever found. This, as you know, was one of the principal objectives sought in the negotiation of the Angle-American Petroleum Agreement.

The foregoing is, I think, the outline of a sound foreign oil policy and program for the United States. Lest it be misunderstood, I hasten to add that it is not a program for forcing imports, or for undermining the American domestic petroleum industry, or for flooding the country with cheap oil. It is a policy and program designed to ensure that, if this country finds that it needs to import substantial quantities of oil to maintain its complex industrial economy and to ensure its military security, the circumstances of world trade in oil will be such as to guarantee the availability to the United States of whatever petroleum supplies the domestic industry may be incapable of producing.

International Oil Problems

Finally, we turn to the question of what I earlier called international oil policy. The situation that confronts us

can be described in the following terms:

In the first place, petroleum is a commodity of tremendous strategic and military, as well as commercial, importance, and it is therefore an object of acquisitive competition among nations. This theme needs no elaboration.

In the second place, the irregular geographic distribution of petroleum reserves bears no relation to political boundaries or to the geographic distribution of the world's population. The occurrence of oil is determined by geologic phenomena of the remote past. It has in general been laid down along the shore lines of ancient seas, the location of which has little to do with the present division of the earth's surface as between land and water and has a purely adventitious relationship to present physical and human geography.

In the third place, oil reserves through sheer accident apparently occur in rough inverse correlation to the present occurrence of industrially advanced areas. For instance, little oil has been found or is likely to be found in Western Europe or along the Eastern seaboard of the United States. Very abundant supplies of oil are found in industrially undeveloped areas and sometimes in almost uninhabited parts of the world.

The foregoing are physical characteristics of the occurrence of oil. Certain other aspects of oil development which derive from the foregoing are less immutable.

For instance, control of underground oil resources, outside the continental United States and the Soviet Union, tends to be vested in a relatively small number of very large corporate organizations. Not more than a dozen companies in all control the bulk of production and marketing of that oil which moves in international commerce. Indeed, for practical purposes, seven companies exercise this control. Pairings and groupings of these seven conduct joint operations in many parts of the world. For instance, four of them control over 70 percent of the shares of the Iraq Petroleum Company, which in turn controls all the oil of Iraq, Qatar, the Trucial Coast, and other less important areas of the former Ottoman Empire; two of them control all the known oil of Saudi Arabia; one controls exclusively the presently developed oil production of Iran, and (in equal partnership with another of the seven companies) controls all the oil of Kuwait; five of them, organized into three corporate entities, control almost all the oil of the Dutch East Indies and do most of the petroleum marketing in the Far East; one holds title to all the developed resources of Hungary; their combined direct and indirect interest in the oil industry of Rumania accounts for almost 50 percent of the total; separately and in various combinations they control most of the oil in Latin America, except in those countries which have nationalized their resources .

This kind of concentrated control arose logically and naturally as a consequence of the geographic location of oil resources. When in fact the most promising oil regions coincided with areas of industrial under-development, and indeed in some cases of political backwardness—areas the inhabitants of which lacked both the elaborate technical competence and the large quantities of capital required for the development of oil resources—it was to be expected that such development which had to be undertaken by enterprises not native to the areas in question, would be undertaken only by organizations possessing large amounts of capital and qualified to assume large risks.

The result of these circumstances was that the great oil companies of the world in devising the arrangements under which they would operate in foreign countries have logically sought maximum latitude in their rights to operate and in their chances of gain, and simultaneously sought to ensure minimum political interference with their activities. This they have sought through the negotiation of concession contracts. A concession contract is, in the last analysis, a comprehensive set of rights, privileges, and immunities on the one hand, and financial and other obligations on the other hand.

The successful negotiations of such contracts as these resulted in situations where the oil companies have enjoyed, or have had an opportunity to enjoy, tremendous grants of economic power and far-reaching rights of self-determination. In cases too numerous to mention the result has been uneasiness, suspicion, and distrust on the part of the grantor and in the more extreme instances this has led to cancellation or expropriation. It promotes conditions under which the temptation always exists for some other power to play upon the uneasiness and suspicion latent in the minds of the granting government and thus establish an opportunity to acquire valuable developed oil rights.

This kind of an over-all situation is not conducive either to peace or to commercial stability.

Goals Set Up

What objectives should be sought if peace and stability are to be ensured? Principally these:

1. To bring about circumstances whereunder, because of diminished political risks, small as well as large units can engage in the development of foreign oil resources.

2. To create conditions whereunder suspicion and uneasiness are allayed because there is some assurance that the contractural relations are fair, just and beneficial to both parties.

3. To promote conditions providing assurance that unnecessary powers are not vested in private oil companies.

4. To assure that all nations will enjoy access on competitive and nondiscriminatory terms to the petroleum resources of the world so that the distinction between have and have not nations with respect to oil will become largely meaningless and the acquisitive greed of nations for control over external oil resources will be correspondingly reduced.

It is as yet too early in the process of moving toward a more orderly and stable organization of the world oil industry for anyone to profess to know how these objectives can best be accomplished.

One promising development taking place is a movement away from the granting of large concessionary rights through bilateral bargaining and in the direction of establishing a uniform and general basis of law governing the acquisition and exercise of rights with respect to oil resources.

Also there is a disposition, in the negotiation of concession contracts and in the formulation of basic laws, to include provisions designed clearly and frankly to recognize the legitimate interest of sovereign governments in the rate at which and the manner in which their oil resources are to be developed and to offer safeguards against two eventualities that governments tend to fear, namely bottling up of their resources by private companies and an excessive rate of extraction.

Also, there is a disposition to welcome the financial and technical participation of foreign nationals or governments in the processes of the oil industry. Consequently, new arrangements are being devised and new ways of organizing oil ventures are being worked out, the object of which is to permit genuine cooperative undertakings with management control continuing to reside in the element that is technically the more competent and that assumes the larger risks. This development is in the direction of stability and harmony. It should be facilitated where practicable by governments. The Department of State is presently rendering help and guidance in the devising of new patterns of cooperation between American companies and foreign countries.

Also there is a disposition to recognize that oil development in foreign countries is not and cannot be something conducted with a view to pecuniary profit alone, but must also be consciously directed toward the eco-

■ CONTINUED ON PAGE 40

Co-Op PLANS

HOWARD A. COWDEN
President, Consumer Cooperative Association

FIRST authoritative details of the projected International Cooperative Petroleum Association (ICPA), and its relations with the private oil industry, have been disclosed exclusively to THE OIL WEEKLY through an interview with Howard A. Cowden, president of Consumer Cooperative Association, and one of the chief sponsors of the worldwide petroleum cooperative.

In his interview, Cowden expressed the following opinions:

1. ICPA may be incorporated in the United States, and "I am hopeful that its headquarters will be in New York City."
2. ICPA will start operations as a brokerage concern, but "in time it is expected that it will engage in all the functions of an integrated oil company."
3. ICPA will operate on a global basis.
4. ICPA will plunge into the question of "political oil," proposing an international petroleum authority for the Middle East.
5. ICPA expects to carry on business dealings with private companies at the international level.
6. ICPA "should be subject to all and the same taxes applicable to private companies operating in the foreign field."

Cowden himself first proposed the formation of ICPA at a 1937 meeting in Paris of cooperative wholesale from various countries. He repeated the suggestion in September, 1945, at a meeting of the International Cooperative Trading Agency in London. At that time a petroleum subcommittee of five from five different countries was named to promote the idea. Meetings of the subcommittee were held, the latest of which was at Manchester, England, July 3, 1946, when Sir Arthur Macdonald, subcommittee secretary, was asked to draft articles and by-laws for consideration by the full committee and others at a meeting in Zurich, Switzerland, October 1, this year.

Cowden reports: "We expect to finalize plans for incorporating the ICPA at the Zurich meeting." He adds:

"In the meantime, cooperatives in a number of countries are making preparations to go forward on a petroleum program. Swedish cooperatives, for example, have set up a national petroleum federation and have purchased a gasoline terminal at the Port of Malmo. They own an interest as well in a tanker concern. Incidentally, Swedish cooperatives are moving rapidly into the petroleum picture, not alone because they believe it will be a service to their members, but also to forestall, if possible, what appears to be a move on the part of the Swedish government to nationalize the oil industry there.

"The cooperatives don't want nationalization, and in that respect they find themselves seeing eye-to-eye with the major oil companies. Moreover, it is evident that the majors there prefer the competition of cooperatives to that of government.

The international petroleum cooperative has been termed in some quarters a "world oil cartel." Because of the sharp issue which the forthcoming Zurich meeting has created, THE OIL WEEKLY put a series of questions to Cowden which are printed below together with his verbatim answers:

Q. Will ICPA engage solely in export-import marketing activities, or will it also engage in production, refining, pipe line transportation and the other functions of an integrated oil company?

A. ICPA probably will start as a brokerage concern, handling exports and imports of petroleum products for its members. In time it is expected it will engage in all the functions of an integrated oil company.

Q. What countries may we expect to be represented in the formation of ICPA and in what areas will it operate?

A. The petroleum subcommittee of five is composed of representatives from cooperatives in England, Scotland, France, Sweden and the United States. It is quite likely that most, if not all, of these will be represented. Cooperative leaders of many other countries have pledged us assurances of support.

Q. Will the international petroleum cooperative do business on a barter basis?

A. Cooperative leaders generally believe in two-way trade, but not necessarily on a barter basis. Two-way trade could be conducted on a barter basis, of course, with trade balances settled once a year, or oftener, if currency stabilization becomes a fact. However, we have never yet traded oil for German-made harmonicas, as an example. Incidentally, we have introduced a new principle in international trade. When an overseas wholesale orders oil from us, for example, we treat it as we do a member association in this country; that is, we credit it with the savings made on its purchases. Such savings are credited toward the purchase of shares to qualify it for membership in our wholesale, after which such savings are payable to the overseas cooperative in cash. As a result, many European cooperative are members of our wholesale and share in its savings to the extent of their patronage each year. These savings are in dollars, a fact which aids materially the organizations in those countries needing dollar exchange. The more they purchase the greater the dividend, and the greater the dollar exchange to their credit. The patronage refund has many possibilities which are only just now being appreciated in many quarters.

Q. If the association engages in production and refining, would such activities be carried on within the United States? Is it correct to assume that CCA and its associated groups have now, or may have shortly, an excess refining capacity, and hence would welcome the opportunity to sell to cooperatives abroad?

A. ICPA will operate on a global basis both as broker and still later as fully integrated organization. Some of its facilities undoubtedly will be in the United States. Some of them may be in South America. Some may be in the Middle East. So many imponderables are in the picture at the moment that no positive answer is possible.

Q. Will the activities of ICPA actually be competitive with private industry to the extent that the association will seek on a competitive basis oil markets now being served by private companies?

A. Cooperatives in the domestic mar-

ket are in competition with private companies. It is not conceivable to me how they can be on any other basis internationally.

Q. Where does the association plan to turn for its sources of oil?

A. We are urging that Middle East oil be placed in the hands of an international oil authority under the Social and Economic Council of the United Nations, an authority that would implement the "equal access" clause of the Atlantic Charter. We believe that it is to be preferred to what is going on at present—the big powers riding roughshod over the sovereignties of the little nations that happen to be rich in oil deposits, each seeking oil in its own way. It is dangerous to the peace of the world. Failing that, why shouldn't ICPA organize cooperatives among the people of Venezuela, for example, and help prepare them technically and otherwise to process their own crude? When they are thus once prepared, the oil will be forthcoming. No doubt, too, our own State Department will give cooperatives fully as much backing outside the United States as it is giving currently to private companies.

Q. What relationship do you feel may and should exist between ICPA and private industry?

A. For several years now Consumers Cooperative Association has been trading refined fuels and carrying on other business dealings with private companies. There is no reason to believe that such business dealings should not be carried on at the international level when they prove to be mutually advantageous. The private company that handles a good product, takes a reasonable margin, and gives good service, will be able to hold its own against all comers.

Q. If both cooperatives and private business have a place in the oil industry, about what percentage of the industry would the cooperatives regard as eventually their proper share?

A. Let the consumer decide this issue. He is the one who eventually will decide it anyway. Without cooperatives in the field he has no choice as between profit and non-profit business. With cooperatives he has alternatives. I should add, perhaps, that cooperatives doing only a small percentage of the total business usually have an influence out of all proportion to their size. This is because of their great potential.

Q. Do you believe that the international petroleum cooperative should be subject to all and the same taxes applicable to private companies operating in the foreign field? Do you believe that cartel legislation and antri-trust laws should be equally applicable to ICPA as to private enterprise?

A. An international petroleum cooperative should be subject to all and the same taxes applicable to private companies operating in the foreign field, including income taxes on that which is income to the cooperative corporation. On money paid to members as a patronage refund, as provided for in its articles and by-laws, obviously the cooperative corporation should not pay income taxes on such funds. To ask it to do so would be like asking a firm to pay income taxes on money handed back to the Federal Government under renegotiation.

Cowden added: "Cooperatives are not above and beyond the law. Certainly ICPA should be governed by laws in every country in which it operates, including those against cartels and anti-trust laws. However, it is the quest for profits that leads to cartel arrangements and to violations of anti-trust statutes. Consumer cooperatives are non-profit, service organizations that incarnate the public interest."

Oil in the U. S. Foreign Policy

■ CONTINUED FROM PAGE 36

nomic betterment of the peoples within whose territory oil is found, by the provision of fair revenues, by cooperative planning of public improvements, and by the provision of abundant supplies of local fuel at reasonable prices.

Finally, there is a growing pressure for the negotiation of some kind of world oil agreement which would result in the establishment of an international body under the United Nations organization. Only time will tell the full scope and efficacy of such international undertaking as may ultimately emerge.

It is possible that the pattern of international consultation on oil will take something like the following form:

An instrumentality of the United Nations, consisting of expert representatives of many nations, would give continuing consideration to the political and economic problems of the international oil trade; would study the terms and conditions under which oil is developed in various parts of the world, whether under concession contracts or under general laws; and would be able and ready to advise governments and oil companies about the patterns of arrangements most likely to prove mutually beneficial and conducive to stability of commercial operations.

Such a body might additionally have authority to review the terms of concession contracts and to recommend revision thereto. Nations which had already concessioned out part or all of their petroleum resources to private foreign companies might be free to appeal to such international body for a review of either the terms of the concession arrangements or the concessionaire's compliance. Nations believing themselves to have inadequate access or at unreasonable prices to the oil supplies of the world would be free to appeal to the international body for a review of the circumstances of the case; and the international body might be authorized to recommend to governments and companies corrective measures if such were needed. Through the fact-gathering facilities of the international body such basic facts of the international oil trade as costs, prices, royalties, inter-company contracts, and similar data would be of public record available internationally.

I shall not now conjecture further about the character and structure of an as yet hypothetical future world oil organization.

I recognize, of course, that existing international political stresses cannot be overcome overnight, any more than the tendency to think of oil along national, strategic lines. Nevertheless, it is not too soon to begin thinking of the conditions under which an international body could make a valuable contribution to the serious problems which have already arisen in the international field in regard to oil and which promise to become more serious in the future.

In any case, one important consequence of a collaborative undertaking among nations with respect to oil would be that a careful, competent, and continuing effort would be made to understand the causes of political friction, of conflict, of instability that might or do arise in connection with the international oil trade. Such an effort would be made by nations intent upon achieving tranquil relations, and therefore no matter how limited or how ambitious its scope might be it would be bound to bear fruit.

The governments of the United States and the United Kingdom, when they negotiated their bilateral agreement on petroleum, undertook to seek early multilateral agreement among nations and to promote the convocation at an early date of a world oil conference looking toward the negotiation of such an agreement and the establishment of an international consultative body. The early realization of this objective not only will be of incalculable benefit to the preservation of cordial relations among nations with respect to a potentially explosive commodity of tremendous industrial and military significance; it will be of comparable benefit to the commercial prosperity and stability of oil industry operations.

Anglo-Bahamian Ready For Bahamas Exploration

Anglo-Bahamian Petroleum Company is stepping up its exploration activity in the Bahama Islands to peak intensity, and drilling will be under way before the first of next year.

A gravity meter crew is at work on Andros Island, with operations in charge of G. M. Shaw of Anglo-Iranian Oil Company. Dr. T. C. Richards has arrived to serve as the company's chief geophysicist, and M. C. Seamark reached Nassau August 25 to arrange preliminary drilling plans. He is Anglo-Iranian's chief drilling expert and will head all field work there. In addition, Col. W. E. Brown, formerly of the British Army, is in the Bahamas as chief surveyor for Anglo-Bahamian, a wholly-owned Bahamas operating subsidiary of Anglo-Iranian.

Anglo-Bahamian is moving much equipment to the islands, most recent arrival of which is a 350-ton landing craft acquired from the U. S. Navy. This boat will house the geophysical crew of 20 men during their operations in the marine area.

The British company holds a concession totaling 12,925 square miles, of which all but 1200 are water-covered. Only this company and the Bahamas Company have concessions on the island itself. Between their holdings on Andros, there is presently an unassigned strip of land which, it is reported, will shortly be divided into concession grants for both Anglo-Bahamian and Superior Oil Company of California.

Superior Wildcat

The only active test in the Bahama Islands is a wildcat being drilled by Bahamas Oil Company, subsidiary of Superior. This test, spudded last April and projected to about 10,000 feet, is located in the approximate center of the northern end of Andros Island about nine miles from the mouth of Stafford Creek.

Andros Island itself is a limestone formation, the top of a submarine mountain, similar geologically to the Florida east coast and to the north coast of Cuba. Anglo-Bahamian's first drilling effort probably will be a land site, but the major work will be an offshore drilling program.

Water location tests in the Bahamas present distinct engineering problems. Drilling will be confined to the east shore waters where a broad, high submerged shelf reaches out about 75 miles. Anglo-Bahamian is planning to confine its initial attempts to sites not more than 25 feet under water. However, some of these tests may be 25 or 30 miles offshore. Since the area is a hurricane belt, hazards are many.

The gravity meter work is possible in a diving bell up to depths of about 20 feet, and recently larger bells have been used for still deeper work. However, Anglo-Bahamian is planning on doing most of its exploratory work from a "spud" platform, weighing about 15 tons, with hydraulic feet, and capable of being towed easily. On this platform the gravity meter is mounted. The operation is satisfactory in a calm sea but becomes hazardous under adverse weather conditions.

Picturesque Cuban Setting

Shown at right is a drilling scene in the Central Matanzas section on the Island of Cuba, 75 or so miles southeast of Havana.

New Drilling Keeps One Crew Busy On Bahrein Island; Plant Underway

Bahrein Petroleum Company, Ltd., has one drilling crew continuously engaged in new drilling on the Island of Bahrein in the Persian Gulf.

This activity started last March following a suspension of all drilling work since 1940. The present program includes 12 wells to be drilled to the Bahrein zone between 2200 and 2500 feet. The 12 wells include two gas injection wells, 6 new development wells for oil production, and four observation wells which will be located on the flanks of the structure for observation of the movement of the water table.

Since 1938 the company has been injecting high-pressure gas from a deeper zone into the Bahrein zone, and the success of this experimental work has led to the stepping up of the gas injection rate so that recovery of oil will be at approximate ratio of 75 percent by gas drive and 25 percent by water drive.

The six new development wells are being drilled to replace wells captured by gas in the crestal area of the field and to improve the drainage pattern in other areas of the structure.

For the present the company plans to continue producing the field at approximately 20,000 barrels daily. In addition the company is renewing its exploratory program suspended during the war and is preparing to drill 10 structure wells beyond limits of the island but within the domain of the Shiekdom of Bahrein, all of which is under lease to the Bahrein company by terms of its concession.

Meantime, the company, which operates a large refinery on the island, has under construction a modern asphalt plant which will be completed and in operation in July, 1947. The new equipment consists of a vicuum still charging topped crude having a daily charging capacity of 10,000 to 12,000 barrels daily. The reduced stock from the vacuum unit will be charged to convertors and reduced to the required grade of paving or specialty asphalt by the use of low pressure air. The present plans are to ship the asphalt in drums throughout the Near and Far East marketing areas. The total plant investment, including drum manufacturing and trucking equipment, will be approximately $2 million.

Royal Dutch-Shell Group Output Shows Some Drop

Crude oil production of the Royal Dutch-Shell Group amounted to 29,586,000 metric tons (about 210,000,000 barrels) during 1945 compared with 29,924,000 metric tons (about 212,000,000 barrels) in 1938.

In its annual report, the company said that material damage to its distributing equipment, both in Europe and in the Far East, was very great in many countries, including Germany, and it was yet impossible to determine the full extent of the loss.

The Group reported increases in its crude oil production in South America, United States and the Middle East. However, its output in the East Indies and Europe was curtailed sharply because of enemy occupation.

Worldwide Competition in Carbon Black Market Seen

Development of oil and gas fields in Russia, Saudi Arabia and other areas may result in new competition in the international market for carbon black.

Practically the sole supplier of carbon black in the world market until a few years prior to the war, the American industry now must prepare to meet keen competition from other countries, it was testified before the Federal Trade Commission in the closing hearings of a two-year investigation of the activities of the Carbon Black Export Association under the Webb-Pomerene Act.

Russia is known to have at least 22 gas fields, and while its own requirements for carbon black currently are heavy it is considered more than possible that it will be a competitor in the world market in the not distant future. Officials of the export association also see possibilities of competition from Saudi Arabia and other areas which are already, or soon will be developed.

Even before the war, it was said, Roumania and Germany showed signs of getting into the carbon black export market, the latter with a synthetic product which it was forced to develop because of its lack of natural gas, and between 1937 and 1939 exports of American carbon black to Germany were cut from 24 million to 16,350,000 pounds and exports of the German synthetic was getting under way.

New Refinery Is Planned By Egyptian Government

The Egyptian government, according to the Department of Commerce, is planning to erect a new petroleum refinery with an intake of 400 tons (about 2800 barrels) daily. The plant will be located on the same plot as the government's existing Suez refinery, which handles about 200 tons (1400 barrels) daily. The present refinery, although said to be nearing the end of its economic life, will be left intact, so that, if necessary, the two plants could handle 600 tons (4200 barrels) daily.

Oil Prospecting Seen for Sinai and East Deserts

Licenses for oil prospecting over a large area in the Sinai and East Deserts of Egypt have been granted by the Egyptian Government to Anglo-Egyptian Oilfields, Ltd.

Meantime, the Prime Minister of Egypt recently announced that Arabian-American Oil Company had agreed to the extension of its pipe line across Saudi Arabia to Egypt, and also to the construction of a refinery at Suez or Alexandria.

Construction Is Started On Soviet Gas Pipe Line

Surveying work on the route of the natural gas pipe line to be built between Dashava and Kiev in the Soviet Ukraine has been completed and construction work started, the Soviet press reports.

The pipe line will be 323 miles long, second largest of its kind in the Soviet Union, and will carry natural gas from the Dashava area to the Ukrainian capital. Present plans call for 4 compressor stations. The route crosses 92 rivers, 19 railroads, and many highways.

Extensions to Increase Throughput at Haifa

The large refinery at Haifa, Palestine, owned by Consolidated Refineries, Ltd., had a total throughput of 4,010,853 tons (about 29 million barrels) in 1945, according to a statement by Sir William Fraser, official of Anglo-Iranian Oil Company, Ltd. The plant is jointly owned by Anglo-Iranian and Anglo-Saxon Petroleum Company (Shell) with the former company being the operator.

Plans are in hand for further extensions to the Haifa refinery and for installation of a lubricating oil unit.

Threat of Nationwide Strike Seen as Mexican Oil Labor Troubles Continue

The Syndicate of Petroleum Workers of Mexico sniped at government-owned Petroleos Mexicanos with a series of isolated work stoppages during August and as the month drew to a close was threatening the company with a full-scale national strike unless new wage demands were met.

The union won most of what it asked for in the work stoppages and in one instance resorted to what some termed open rebellion to gain its ends. The strike threat came as syndicate leaders and Pemex representatives began a series of talks over a new collective work contract to replace the present agreement which expires September 8.

August also brought a great deal of conjecture as to whether the Mexican government intends to permit foreign interests to return to Mexico for the first time since the expropriation of 1938. The conjecture stemmed from an announcement by the Department of National Economy August 1 that it would accept bids for a contract to explore and exploit 75,000 acres of land near San Ignacio, state of Sinaloa.

The department said it had complied with the national petroleum law by first offering the Sinaloa area to Pemex but that the company was not interested in exploitation there.

Mexico City newspapers said August 22 that statements published in the United States and England to the effect that foreign interests would be permitted to return to Mexico were a result of "a misinterpretation of the government announcement." Nevertheless, private predictions continued that a change in the government's policy will come after President-elect Miguel Aleman takes office December 1.

Labor Troubles

Pemex had ended July plagued with distribution difficulties. It had high hopes of correcting this situation and announced that by the end of August the problem would be solved and that new installations in the Atzcapotzalco refinery in Mexico City would be in operation.

The oil workers union, however, had other ideas and as September approached, Pemex had been able to make good on only a part of its promises.

A plan designed to bring petroleum products from Poza Rica to Mexico City was frustrated by union workers who refused to load the fleet of 85 privately-owned trucks dispatched by Pemex.

More serious was the flare-up at El Ebano, state of San Luis Potosi, where union workers rebelled against "confidential employes" (engineers, technicians and office workers who are non-union) and Mexican troops were sent to protect Pemex property. Certain concessions—more union-filled positions and some rent allowances—were made before this was settled.

A 24-hour walkout was noted early in August at Cerro Azul. This was "to demonstrate solidarity" as well as to protest against alleged failure of Pemex to improve certain medical services.

Later in the month, after workers had walked off the job for 24 hours, and troops had been sent there, Pemex agreed to the demands of Poza Rica workers and the trucks began arriving in Mexico City.

The Pemex plan of opening the Atzcapotzalco refinery before the end of August failed when union workers of Section 35 refused to accept transfer of skilled men from the Mata Redonda refinery in Tampico.

This same section has begun agitation for a nationwide strike as the new contract negotiations started. A half dozen other sections have agreed to the strike but no date has been fixed. New wage and salary-leveling demands of the oil workers total 41 million pesos ($8 million) annually. Wage increases under this figure would average about 25 percent. The salary-leveling is an old problem dating from the days when private oil firms paid different salaries in northern, central and southern zones.

Poza Rica Is Mexico's Best Bet In Meeting Steadily Growing Demand

The Mexican petroleum industry is being pushed to meet the unprecedented demand for petroleum crudes and products in 1946. An export program (5,150,000 barrels during the first 6 months) which promises to exceed last year's 7,900,000 barrels by some 2 million barrels, coupled with an estimated 15 percent boost in domestic consumption, is creating the pressure.

Total production for 1945 averaged 119,000 barrels daily. This figure has been steadily increasing during 1946 and reached 139,000 barrels daily during the month of May, the last complete figure available, and will continue to rise.

The old Panuco field which produces heavy (12-gravity) crude has more than doubled the production of late years. Because of the lack of demand for this type of crude whose principal product is a premium asphalt, production has been curtailed for years and the May, 1946, rate of 28,300 barrels daily is the highest for the field since 1937. Just how much further this rate can be raised or how long it can be maintained is problematical but there is no question but that the field must be very carefully watched.

The equally old Southern field (producing 21-gravity crude) was boosted to 29,000 barrels daily in May, 1945, the highest rate of production since early 1936, and is still being flowed close to capacity. The rate for May, 1946, of 23,400 barrels daily reflects a decline of almost 20 percent but much of this decline may be laid to conservative practices rather than actual falling off of production.

Isthmus of Tehuantepec production remains around the 15,000-barrel daily level as it has done for some years. No fluctuations of importance either up or down are anticipated in this area.

The Poza Rica field will have to bear the brunt of the increasing demand for this year and, unless some new fields are found, for the next years to come. Untried as yet in the sense that it has never been pushed to capacity, Poza Rica has been gradually increased from about 57,000 barrels daily in 1944 to its May, 1946, rate of 72,000 barrels daily. It should be recalled that this field has been produced for short periods at rates of almost 100,000 barrels daily but its real capacity has never been definitely fixed.

Should 1946 demands require an increase of 15 percent over last year's production, which seems to be the case at present, Poza Rica will have to furnish close to 73,000 barrels daily of the 137,000 barrels daily required. In fact, Poza Rica will have to meet all future increases in demand plus the almost inevitable declines in the old fields.

Dual Completion From Eocene Sands Possible in Amana Area, Venezuela

Recent developments on an older northwestern Venezuelan prospect give promise of commercial production from the Eocene pay with further possibilities of deeper Cretaceous limestone production at a later date. A new well is now being operated in the area which has already tested some oil, although not yet completed, from a relatively shallow depth.

Known as the Amana area, some 18 miles northwest of Shell's new Mara field, and about 20 miles northerly from the La Paz field, it is the scene of some drilling by Mene Grande Oil Company as early as 1928, which resulted in completion of one well. However, during the intervening years it has been inactive.

Several years ago the Drilling and Exploration Company, of Dallas, worked up a deal whereby they would drill, receiving acreage and assistance from Mene Grande and Venezuelan Atlantic Refining Company. The first well was drilled in 1943, operated by Drilling and Exploration Company under the name of Venezuelan Exploration Company, and was a dry hole at 5200 feet. Since that time, more interpretative work was done and the acreage situation was consolidated for more convenient operation. Lion Oil Refining Company became interested, and Mene Grande contributed its acreage, retaining an override in the part of the checkerboard it originally owned, and the Guasare Oil Company was formed, in which Venezuela Exploration (Drilling & Exploration Company) owns a quarter interest, Lion Oil Refining Company owns a quarter, and Venezuelan Atlantic owns a half.

Dual Completion Sought

Amana 3 was started early this year, and drilled to 5300 feet. Following electric logging, the well set casing at 5129 feet and proceeded with tests made through casing perforations at intervals from around 4000 feet on up to 3175 feet, all in Eocene sands. Perforated for completion at 3180-3225 feet in a sand identified as the Mostrencas member of the Eocene, on test the well flowed oil at the rate of 200 barrels daily, 31-gravity crude with no water.

A dual completion will seek to bring into production by perforating the sand interval between 3275 feet and 3955 feet, which contain 250 feet of net sand. Flowing dually it is hoped a 500-barrel daily producer will result. Successful completion would allow a program of development to complete several such wells as a nucleus of production while drilling a deep test to explore for possibilities of the Cretaceous limestone which is such an encouraging development on Shell's properties at La Paz and Mara.

A medium-duty diesel powered rig is being used and will be used until it is necessary to go beyond its capacity in prospecting for the Cretaceous. As presently set up, it is capable of drilling to 6500 feet or deeper.

The structure is anticlinal with no major faulting apparent, and was first worked out by geological means. The original well drilled by Mene Grande Oil Company was completed as a small producer and is still capable of producing some oil.

Mutual Benefit Said Aim of Oil Operation in Venezuela

An official spokesman for oil companies operating in Venezuela has assured the government that the oil companies have but one interest in Venezula—to develop oil resources for the mutual benefit of the country, workers and the companies. The spokesman said oil companies will not take part in Venezuelan politics.

The statement was made after 50 U. S. citizens residing in Venezuela sent a petition to the state department in Washington decrying the growth of communism in Venezuela. Some of the signers were employes of oil companies, but company officials stressed that these individuals acted on their own initiative and not as representatives of their respective companies.

Simultaneously, A. T. Proudfit, president of Creole Petroleum Corporation, said his company demonstrated its belief in the future of Venezuela by having invested large capital funds and by having big plans for the next five years. He said the best way to demonstrate the superiority of free enterprise system was to provide the common man with means for better life, such as the latest Creole contract with its workers.

Refining Outlet Sought For Brazil's Production

Crude oil production in the government-owned and government operated oil fields in the State of Bahia, Brazil, averaged about 220 barrels per day during the first quarter of 1946, according to the *Foreign Commerce Weekly*.

A number of outlying locations were drilled in an effort to extend the fields, but results were disappointing. Many producing wells remain shut in for lack of sufficient refining capacity.

Meantime, the National Petroleum Council has authorized four separate Brazilian financial groups to present final proposals for construction of four refineries. Two refineries, one of 10,000 and one of 6000 barrels daily capacity, are to be built in Sao Paulo. The other two refineries, each of 8000 barrels daily capacity, are slated for Rio de Janeiro.

It is planned to operate the refineries on imported crude, and to distribute the refined products through the facilities of the five large oil companies now importing refined products into Brazil.

Kirkleatham Wildcat Test In Yorkshire Is Abandoned

D'Arcy Exploration Company's Kirkletham 2, wildcat test in Yorkshire, England, has been abandoned at a total depth of 3091 feet in Carboniferous strata. As in the company's Kirkleatham 1, gas was encountered, but the production was smaller in the second well because of low porosity and permeability of the Upper Permian limestones.

The company now is preparing to drill a wildcat test near Market Weighton in South Yorkshire.

Seismic work is being conducted by the company in the Formby area and the gravity survey work of the southwest Midlands has been extended to Gloucestershire, while a magnetometer survey has been initiated in Staffordshire to the east of Market Drayton.

Horigan Succeeds Smith

Lloyd Gaston Smith, of Manhasset, N. Y., has resigned as president and general manager of Lago Oil & Transport Company, Aruba, Netherlands West Indies, to join the Foreign Refining Coordination Department of Standard Oil Company (New Jersey).

Succeeding Smith at Lago, an affiliate of Jersey Standard, will be John J. Horigan, of Norwich, Conn., who has been a director of Lago since January, 1942.

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By L. J. Logan

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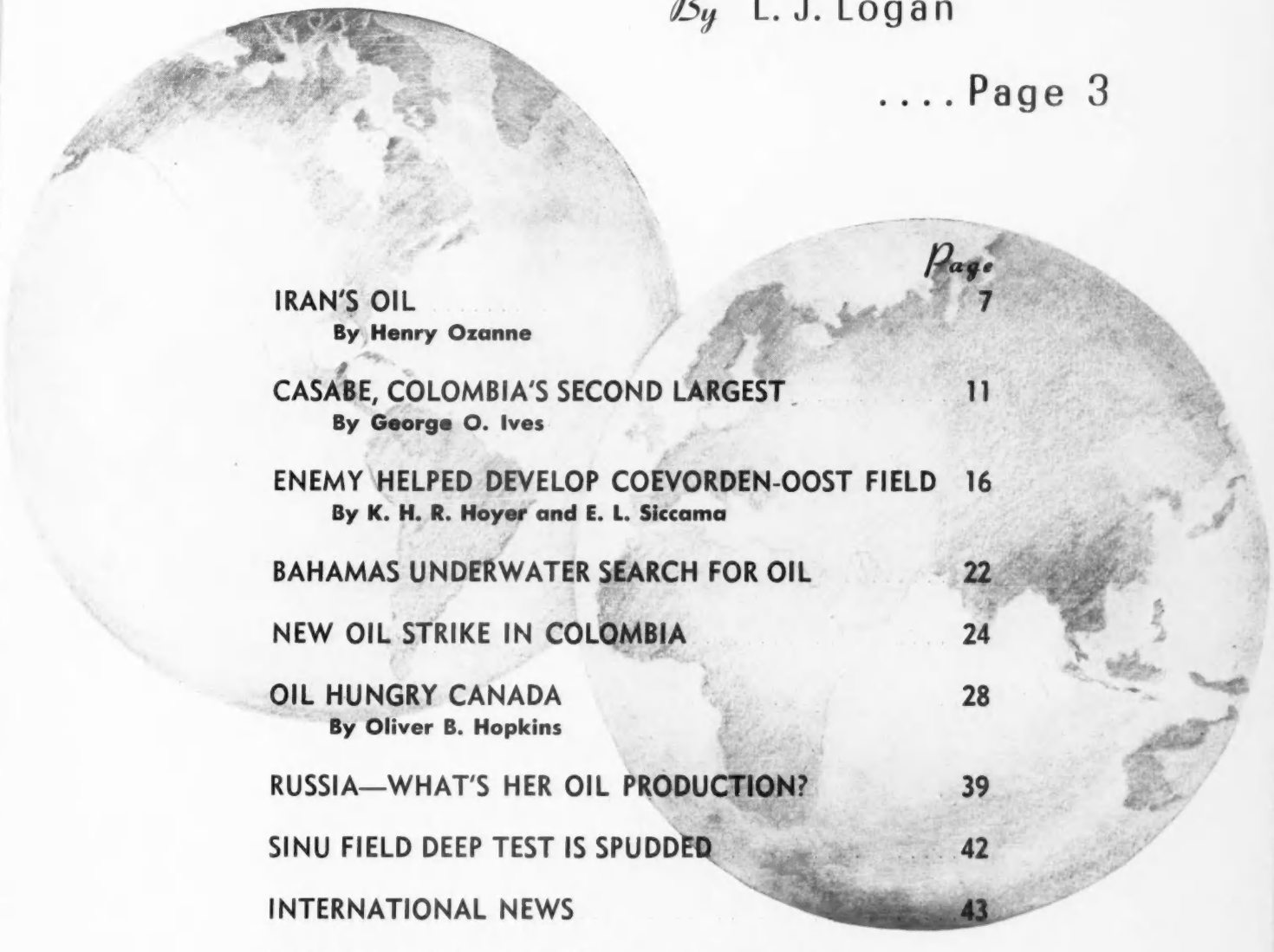

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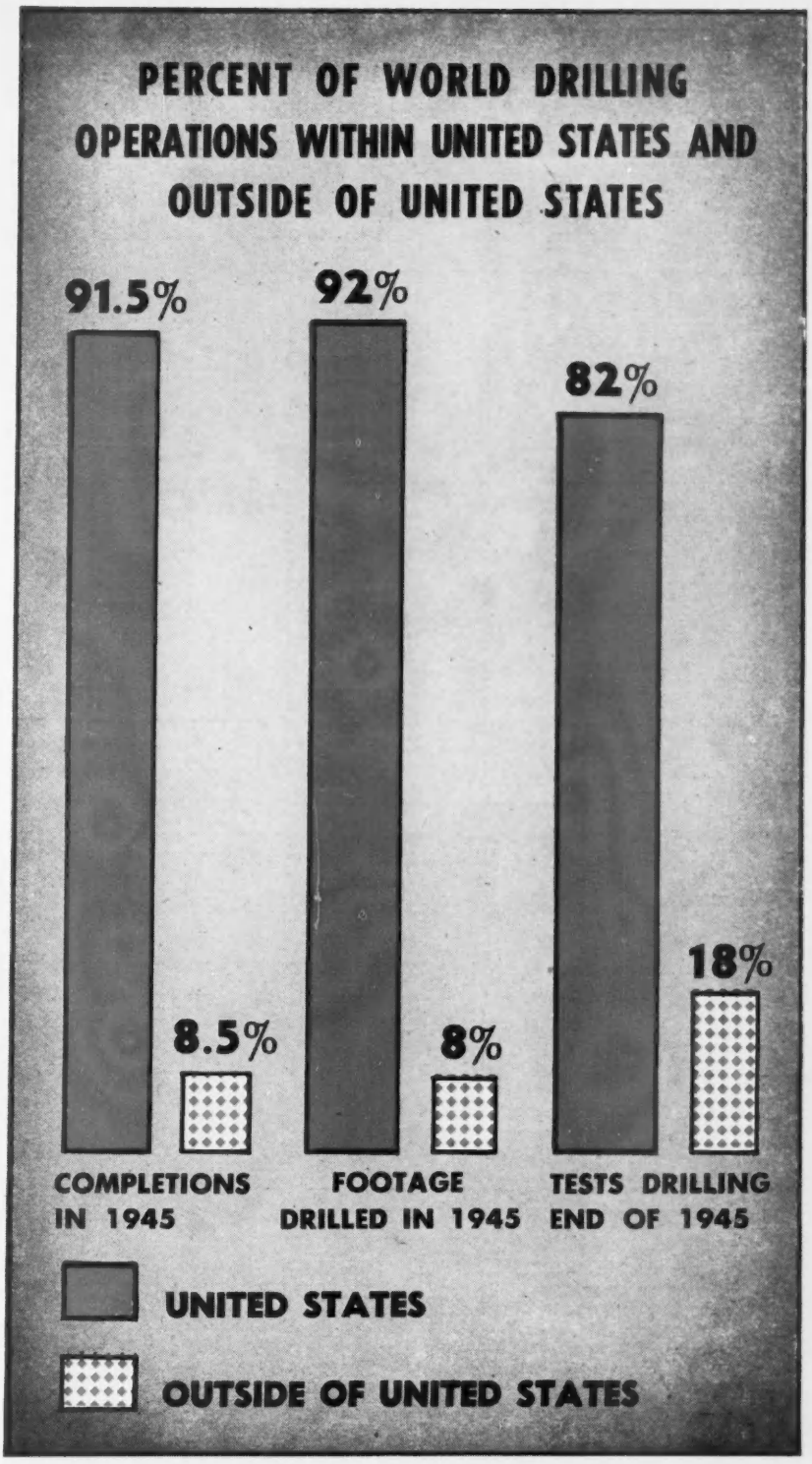
World Drilling Operations

By L. J. LOGAN, Associate Editor

A SURPRISINGLY small volume of drilling occurs outside of the United States, this country accounting for a larger portion of the world's drilling activity than of the world's crude oil production.

Actual figures for numerous countries and estimates for others indicate that at the end of 1945 the United States accounted for approximately 82 percent of the world's drilling operations at that time, although U. S. production during 1945 was only about 62 percent of the world total. This disparity existed because of large flush production in various foreign fields where drilling of new wells was unnecessary or held down by lack of equipment.

The Middle East produced 6½ percent of the world's output in 1945 but had not much over a dozen wells drilling at the end of the year. Venezuela produced nearly 12 percent of the world total but had less than 100 wells drilling December 31 out of a world total of about 5644. Mexico was a substantial producer but depended heavily on flowing wells at Poza Rica and was drilling only 16 wells as the year ended. The Far East yielded substantial production from wells that survived war destruction but was only beginning in a very small way to drill new wells when the year ended. Miscellaneous foreign countries were depending mainly on old wells for production and were relatively inactive in drilling new wells. Outside the United States only about 1007 wells were drilling at the end of the year, compared with the 4637 in the U. S., or a world total of 5644.



From the standpoint of wells completed during 1945, the United States took an even more predominant role in drilling. It accounted for about 91.5 percent of completions against about 8.5 percent for the rest of the world. Including input, disposal, deepened, and other special wells, along with oil, gas, distillate and dry wells, there were about 28,238 world completions during 1945, including 25,846 in the United States and a partly estimated total of 2392 in all other countries.

Since wells in the United States are on the average somewhat deeper than those elsewhere, the U. S. wells accounted for about 92 percent of footage drilled.

An acknowledged serious weakness in these world figures on wells drilling and

Relation Between Annual Production and Drilling

COUNTRY	Wells Completed in 1945	Wells Drilling, End of 1945	Annual Production, 1945, in Barrels		
			Total	Per Well Completed	Per Rig Operating
World Total	28,238	5,644	2,633,021,000	93,244	466,517
United States	25,846	4,637	1,711,103,000	66,204	369,011
Outside United States	2,392	1,007	921,918,000	385,417	915,509
Venezuela	531	94	321,902,000	606,218	3,424,489
Middle East	10	16	200,990,000	20,099,000	12,561,875
Russia	*700	*500	150,000,000	214,285	300,000
Mexico	53	16	41,975,000	791,981	2,623,437
Roumania	91	42	34,010,000	373,736	809,762
Argentina	155	51	22,880,000	147,613	448,627

* Estimated.

Wells Completed in 1945 and Number Drilling at End of Year

COUNTRY	Oil	Gas	Dry	TOTAL Wells	TOTAL Footage	Drilling 12-31-45
North America Except United States:						
Canada	51	195	191	437	417,121	§50
Cuba	....	....	2	2	12,046	30
Mexico	28	5	20	53	250,406	16
Others	....	....	3	3	21,641	....
Total North America Except U.S.	79	200	216	495	701,214	96
South America:						
Argentina	132	3	20	155	*569,625	51
Bolivia	*5	....	*1	*6	*18,000	5
Brazil	9	1	2	12	29,816	3
Chile	1	....	....	1	7,438	3
Colombia	49	....	10	59	*156,350	26
Ecuador	*40	....	*14	*54	*153,000	*30
Peru	84	....	18	102	318,764	41
Trinidad	*37	....	*4	*41	*164,000	18
Venezuela	487	5	39	531	2,879,096	94
Total South America	844	9	108	961	4,296,089	271
Europe:						
†Albania	....	....	....	....	....	....
†Austria	....	....	....	....	....	....
†Czechoslovakia	....	....	....	....	....	....
England-Scotland (Wildcats)	....	....	16	16	48,398	*5
France	....	2	15	17	49,982	18
Germany-Holland	5	....	....	5	13,400	3
Hungary	10	....	1	11	63,040	....
†Italy	....	....	....	....	....	....
Poland	*36	....	*18	*54	*81,000	44
Roumania	73	10	8	91	524,800	42
Russia	*550	*50	*100	*700	*2,000,000	*500
Total Europe	674	62	158	894	2,780,620	612
Africa:						
†Algeria	....	....	....	....	....	....
Egypt	12	....	2	14	58,278	....
Morocco	5	....	13	18	24,017	12
Total Africa	17	....	15	32	82,295	12
Middle East:						
Bahrein Island	0	0	0	0	0	0
Iran	6	....	....	6	28,524	10
Iraq	....	....	....	....	....	2
Kuwait	....	....	....	....	....	⊙
Qatar	....	....	....	....	....	⊙
Saudi Arabia	4	....	....	4	23,285	4
Total Middle East	10	....	....	10	51,809	16
Far East:						
British Borneo	....	....	....	....	....	+
Burma	....	....	....	....	....	+
†China	....	....	....	....	....	....
†India, British	....	....	....	....	....	....
†Japan	....	....	....	....	....	....
Netherlands, East Indies	....	....	....	....	....	+
†New Zealand	....	....	....	....	....	....
†Sakalin	....	....	....	....	....	....
Total Far East	†	†	†	†	†	†
Total Foreign	1,624	271	497	2,392	7,912,027	1,007
(Percent of World)	10.5	9.8	5.0	8.5	8.0	17.8
‡United States	13,891	2,484	9,471	25,846	90,486,215	4,367
(Percent of World)	89.5	90.2	95.0	91.5	92.0	82.2
Wolrd Total	15,515	2,755	9,968	28,238	98,398,242	5,644

* Estimated. † Data not available, but comparatively little development indicated. ‡ For U.S. oil wells include distillate wells; dry wells include 2245 input, disposal, and deepened wells; wells drilling include 594 shut down. ⊙ Operators recompleting some wells plugged during war. + Rehabilitation of war-damaged fields started but hampered by need of equipment. § Western Canada only; data not available on Eastern Canada.

wells completed is the unavailability of information on development in Russia and various Russian-dominated oil producing countries. Those satellites are not relatively very important, but Russia itself is, and the best guesses possible on Russian activity were necessary in order to arrive at any close approximation to world totals. Therefore, estimates for Russia were attempted, and although highly conjectural, they took into consideration what was known about the trends of production in Russia, and authentic information of the past on wells and footage drilled and drilling rigs employed.

In connection with world-wide drilling operations and world-wide completions, it is noteworthy that the United States, as the world's leading oil producing country, has achieved outstanding efficiency with the drilling rigs utilized, drilling and completing wells in relatively short time and showing a high ratio of completions to rigs used. On the average, a rig in the United States has been drilling about 5½ wells per year, while in the rest of the world the average has been somewhat less than 2½ wells per year or a little less than half the U. S. average. This is not explained by material difference in drilling depths, as the average in 1945 was 3501 feet for the U. S. and 3308 feet for the remainder of the world. An exception in rapidity of completing wells in Venezuela, the world's second largest producing country, where U. S. companies do much of the development and show results comparable with those in the United States.

Among the factors explaining the relatively large number of wells drilled with the rigs employed in the United States are broad operating experience, availability of good equipment and skilled workmen, and the highly developed transportation and communication systems. In many countries oil development encounters difficulties of supply transportation, and skilled personnel.

Necessity Breeds Efficiency

Another important reason for relative efficiency of U. S. drilling is the economic necessity for it, as U. S. wells on the average are far less productive than wells being drilled in some of the leading foreign countries. To get a given amount of daily production, the U. S. has to drill more wells than would be required in some countries abroad, and it has been necessary to achieve the required efficiency to do this. At the end of 1945 U. S. oil wells were averaging only 10.6 barrels production per day and they pulled the world average down to 15.2 barrels per well, while wells in the rest of the world averaged 59.5 barrels daily output. Even among the best flush fields of the United States only a few averaged more than 200 barrels daily per well at the end of 1945, compared with an overall Venezuelan average of 213 barrels per well, 6821 barrels daily per well in Iran, 6429 daily per well in Iraq, 2600 daily per well in Saudi Arabia, 114 daily per well in Mexico.

When well completions and drilling rigs are considered in relation to annual production, it is emphasized again that the United States has to drill relatively many wells and do so with as few rigs as possible in order to get the heavy production required and to maintain producing ability and reserves. As shown in a table herewith, the record-breaking production of 1,711,103,000 barrels in the United States in 1945 represented only 66,204 barrels for each well completion compared with 385,417 barrels of annual production per completion for the rest of the world. Similarly, the U. S. production of 1945 was equivalent to only 369,011 barrels annual production for each active drilling rig counted as of the end of the year, compared with 915,509 barrels annual production per active rig in the remainder of the world. Virtually all important foreign producing countries showed better records from these angles than the United States, although in some of them the better current production as related to drilling may have been at the expense of proved reserves and future production.

Politics Makes Future Uncertain . . .

Iran's Oil

By
HENRY OZANNE
Staff Writer

WHILE Iran is the site of the oldest oil fields in the Middle East, present acute political problems make her petroleum future the most uncertain of any nation east of Suez. Internal dissension and the growing hostility between Britain and Russia throughout all West Asia, constitute a serious threat to the further development of Iran's oil.

Yet, until now at least, these difficulties have not slowed Iranian production. Crude production in Iran during 1945 totaled 16,839,490 tons (127,407,581 barrels), an increase of 3,500,000 tons (26,481,000 barrels) over 1944, and an amount that set an all-time record for Anglo-Iranian Oil Company, Ltd., sole operator in the country.

Production in Iran for recent years is announced by Anglo-Iranian as follows:

	Tons	Barrels
1940	8,626,639	65,269,151
1941	6,605,320	49,975,851
1942	9,399,231	71,114,582
1943	9,705,769	73,433,848
1944	13,274,243	100,432,923
1945	16,839,490	127,407,581

By months for 1946 Anglo-Iranian reports the following petroleum production:

1946	Tons	Barrels
January	1,571,000	11,886,186
February	1,496,000	11,318,736
March	1,717,000	12,990,822
April	1,743,000	13,187,538
May	1,765,000	13,278,330

If the rest of 1946 averages out as did the first five months, Iran's oil production this year will reach 20,000,000 tons (151,320,000 barrels). This is about a 51 percent increase over 1944 and more than doubles the output in 1943.

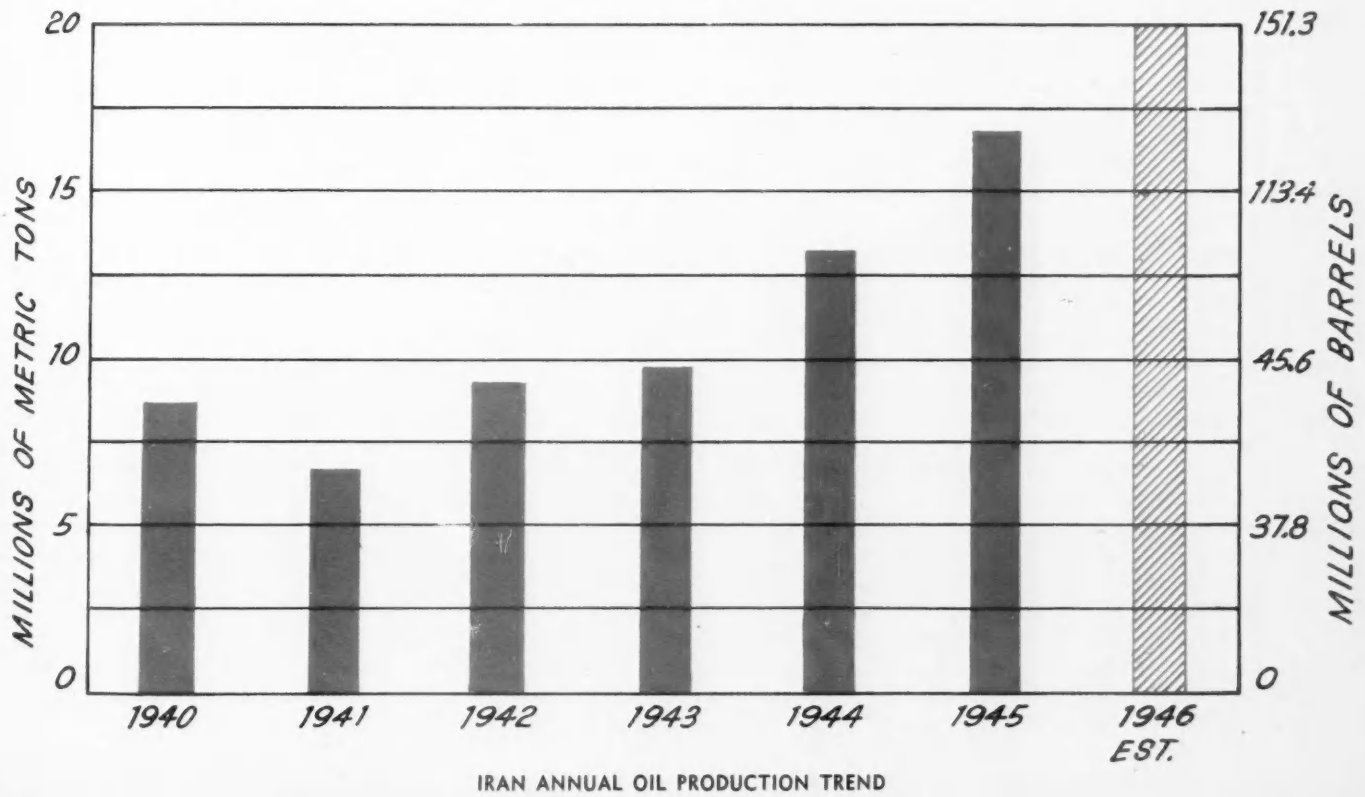
The fields at Masjid-i-Sulaiman and Haft Kel continue to be the main producing reservoirs, but Gach Saran and Agha Jari made substantial contributions to 1945's production total.

Difficulties Overcome

Sir William Fraser, chairman of the board of Anglo-Iranania, reports that the company recently has been confronted with extremely difficult drilling problems at Agha Jari caused by salt water and high-pressure gas in certain strata. However, he explains by development of a special pressure-drilling technique, "we have gradually overcome these difficulties." He adds:

"We are continuing the search for further fields and for extensions of our existing fields. In the latter category is an area northwest of Masjid-i-Sulaiman within easy reach of our main pipe line system to Abadan. We have a considerable capital invested in this system and it obviously would be advantageous if we could find reservoirs adjacent to it."

Sir William says that the Abadan refinery, world's largest, now running in excess of 400,000 barrels daily, has undergone extensive expansion in the last two years, especially in the construction of an aviation spirit plant. "And the refinery has also been expanded by additional distillation equipment and other plants of all kinds and by the complementary provision of workshops, power and water supplies, oil loading facilities, storage, wharfage, transport, stores and many other ancillary services. The result of these efforts, many of them improvised and consummated under extreme difficulties, is that the capacity



IRAN ANNUAL OIL PRODUCTION TREND

of the Abadan refinery is now almost double what it was before the war."

Anglo-Iranian has undertaken extensive community improvements on Abadan Island, which formerly was a desert fringed by a riverside area of date gardens and adjoined by a small village. It is now the site of one of Iran's largest townships, most of the inhabitants of which are company employes and their families. The company has built more than 14,000 homes and quarters for its personnel, and has provided roads, sewage disposal systems, electricity, water and other facilities for every house, in addition to the importation of needed cement, woodwork, roofing, kitchen, sanitary and household fittings. An extensive building program is still under way.

All permanent houses are of brick or stone and are equipped with electricity, water facilities and all modern installations. There are also company-supported clinics, welfare centers, restaurants, shops, clubs, theatres, schools and recreation facilities. The medical staff now comprises 45 doctors, a dental staff, and nurses, medical assistants and health inspectors.

Employe Hospitals

Anglo-Iranian operates two general hospitals at Abadan and at Masjid-i-Sulaiman, and 20 dispensaries throughout the area of company operations. The hospital accommodations at Abadan are in process of being increased and more health clinics are to be set up in residential areas. In 1945, the company provided care for 9500 cases at its hospitals, while 130,000 of its personnel were treated in this own quarters, and over 500,000 received dispensary treatment.

Seventeen schools have been built and presented by the company to the Iranian educational authorities. Evening classes for adults have been conducted for 20 years. Technical training programs were introduced in 1923 and by the end of last year about 1700 Iranian youths were being trained in a dozen different fields of specialized work.

In 1939 the company completed and equipped the Abadan Technical Institute at a cost of $500,000. This institute offers high education opportunities to the Iranians, of whom 460 were enrolled in it in 1945.

Anglo-Iranian also has established dairy, poultry and vegetable farms at Abadan and at the fields where foodstuffs are inadequate. In the next two years these areas of cultivation are to be extended greatly. Even fishing has been sponsored with a view to making available quantities of fresh fish at prices within the purchasing power of all employes. As an anti-inflation measure, the company supplemented increases in wages by the issue of free rations and by the sale of other foodstuffs at prices below cost. This program has been discontinued with the signs of subsidence in inflation.

Situation in Kuwait

Anglo-Iranian is an equal partner with Gulf Oil Corporation in Kuwait Oil Company, and recently has announced plans for increased production in Kuwait. Wells have been reconditioned and tested there, a production system has been installed, and a loading terminal, with submarine pipe lines has been constructed on the Persian Gulf coast. Shipments of crude were begun in July, 1946, one of the first of which was 100,000 barrels for the Gulf Refining Company's test laboratories at Philadelphia.

Great Britain is frankly concerned with the security of her vast interests in Iranian oil. The British government, a 56 percent stockholder in the Anglo-Iranian company, recently notified the Iranian government that Britain expects Teheran "to insure that such conditions of security prevail in the country as will enable Persian oil to play its full part in Persian and world economy."

Watch for—

Further Articles by Henry Ozanne, Oil Weekly Staff Writer, now headed for the Middle East

The statement, issued by the British foreign office, was prompted by current labor disturbances in Iran, and coincided with the announcement of movement of additional British Indian troops to the Persian Gulf port of Basra, in Iraq. This reported troop movement brought sharp criticism from Moscow, and similar protests from Teheran. The labor strikes which continued several weeks at the oil fields affected about 70,000 company workers, a number representing half the industrial labor of all Iran.

Russia to Attempt Grab?

It is generally conceded that this type of internal disturbance in Iran at the present time is simply a reflection of the wider ideological conflict between Russia and the West which is spreading over all the Middle East. The gravity of this situation, and the doubt as to whether Iranian oil can long be kept from a possible Russian grab attempt, are suggested in a series of recent political events:

1. Iran has petitioned the Paris Conference for admission as a member in full status of the current sessions. Iran made it clear that she did not wish merely a hearing at Paris, but desired to participate in the Conference "on an equal footing with other members."

2. The Iranian Ambassador at Washington, Hussein Ala, has made the novel proposal that an international corporation be set up to administer the whole oil question of his country on a pooled basis. Ala says:

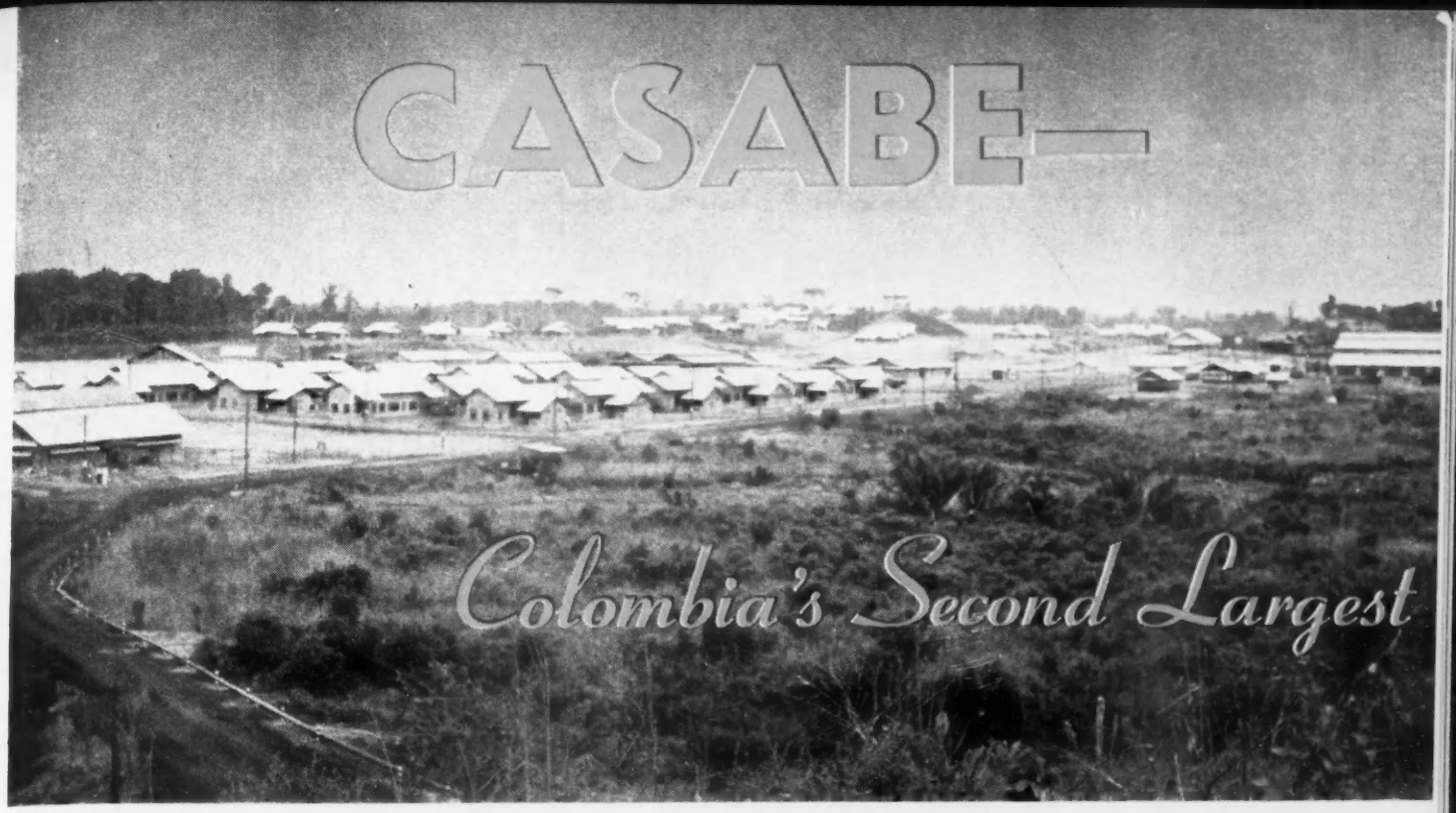
"It would seem that the best method of safeguarding the political and economic interests of Iran, and at the same time enabling the world to benefit from our rich deposits, would be to pool all of the oil of Persia including the area controlled by the Anglo-Iranian company, and to set up an international corporation in which Iranian, American, British, Soviet, French and Dutch companies could have shares. The management might be entrusted for a term of years to the technical experts of a country not a neighbor of Iran. The whole matter might be referred for study to the Economic and Social Council of the United Nations. A special committee of the United Nations is dealing with the atomic bomb; why should not oil, which is just as explosive, be a matter of concern to our world organization?"

Big Problems of Area

3. A program quite similar was suggested by State Department spokesmen in the controversial broadcast on August 17. They said that oil "is and will continue to be a point of friction and conflict" among the nations until they agree on controls which could be set up under the United Nations. During that broadcast John A. Loftus, chief of the State Department's petroleum division, said that Russia's interests in Iran were not exclusively oil; "military security, or the obtaining of an outlet to the Persian Gulf, may be other motives."

A shortage of materials and an uncertain political atmosphere are the two big question marks today in the oil development plans of all the Middle East. The second of these is the great "if" in Iran's petroleum outlook; building materials are being made available there at a more satisfactory rate, probably, than in any other spot in the Middle East. But the political horizon is more clouded than at any other place. Russia's recent acquisition of a concession in North Iran, approximately 100,000 square miles, and already announced plans for a Russo-Iranian oil company, dominated by Moscow, suggest that some form of international control may have to be created over Iran's oil if possible grave future conflict is to be avoided.

CASABE—



Colombia's Second Largest

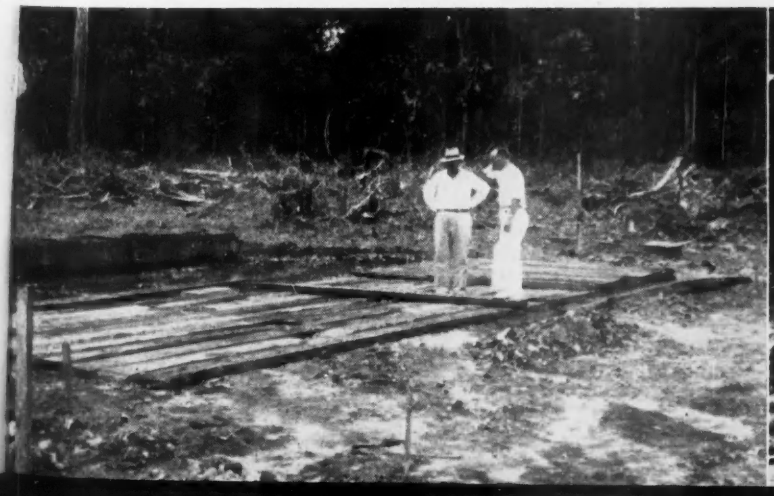
Above—Section of camp area. Group of buildings in foreground is housing for nationals, junior staff, clerks and foremen. In far background are quarters for foreign staff.

By GEORGE O. IVES, Staff Writer

CASABE field, which only went into actual production the middle of 1945, has already become the second largest field in Colombia from the standpoint of daily petroleum output. Since early July, just one year after going on production with a daily output of approximately 8000 barrels of 21-gravity oil, it has gradually increased output with new completions, and is now producing at the rate of 11,000 barrels daily. This output is being moved to tidewater through Andian National Corporation's facilities. With completion of new producers, it seems probable that the Andian line will be required to continue to run at capacity since decline in production from Tropical's De Mares con-

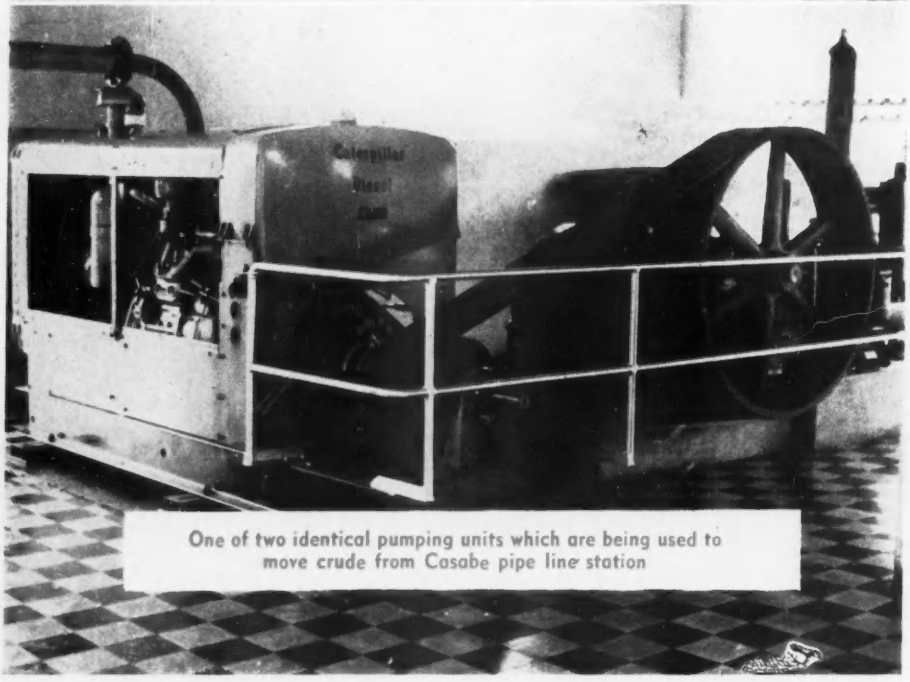
Below—Typical duplex cottage provided for Colombian workmen of the clerk-foreman classification. Brick construction uses brick from the company's own plant built within the camp area.

Below, left—Location being prepared, showing partly completed mat which will take entire load of derrick and rig. Right—Typical rig set-up at Casabe. Power pump drives from unit on derrick floor. Steel mud box at right. Shallow drilling makes unnecessary any auxiliary mud cooling system other than shakers and steel mud ditch.



Central mud station. Pit in foreground contains oil-base mud to be distributed to drilling wells

One of unitized gunstands at central mud station. Connections are built into framework, guns are easily moved



One of two identical pumping units which are being used to move crude from Casabe pipe line station

cession will allow more room for Casabe crude.

Until rather recently the exact extent of Casabe field was not too well known, since there had been very little exploratory drilling carried on. There has now been enough development to tentatively fix the extent of the producing area at 5000 feet, and it is unlikely that ultimate area will exceed this figure very much. Unfortunately the concession is bounded on the east side by the Magdalena River, and part of the producing area undoubtedly underlies the riverbed. However, no provisions have yet been made for granting drilling permits under the river, although the company has filed such application. In drilling the field's 45 wells the other limits of the field have been fairly well defined. Only one of the wells was dry, a test on the west side where production apparently is limited by major faulting.

Reservoir Energy Weak

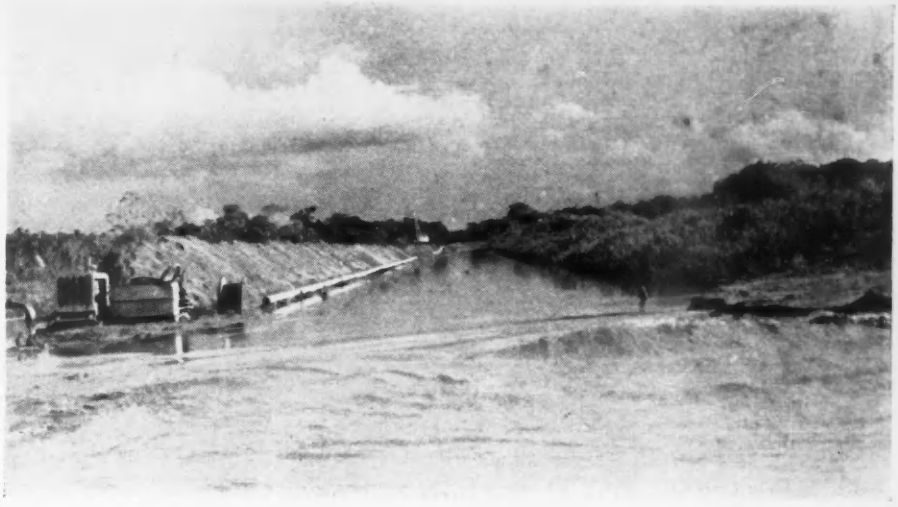
Forty-four of the wells are producers, 21 of which are pumping, and 23 flowing naturally. The field apparently has very little natural reservoir energy and is essentially a pumping field. By pumping it has been found much easier to control field producing rates. Flowing wells have been erratic. Although they flow up to 850 barrels daily, they are inclined to go up or down from day to day, and even die completely without apparent cause, and then resume flowing. Pumping wells are producing 35 to 450 barrels daily.

Producing sections assure an ultimate recovery which, although it is not high enough to be of great significance, at least justifies intensive development. Wells themselves, not excessively expensive, are drilled as a matter of routine to a depth of 3800 feet, and it is possible to drill the entire hole with three-way drag bits. Top of the producing section is picked up somewhere within a range of 1500 feet, starting about 2150 feet from the surface, and the entire producing section will average 1000 feet in thickness, of which section some 300 feet will be net producing pay. All of the sand is in the Oligocene formation, and corresponds to the uppermost of the producing sections at the De Mares concession fields to the east. The deepest well yet drilled in the field was the discovery well—8125 feet. Operators have not indicated whether information found in drilling to that depth shows possibilities of production in the formations from which the deeper and more prolific production comes at De Mares.

Discovery of the field is credited to reflection seismograph geophysical exploration, and after concession contract was validated, Colombian Condor Petroleum Company's Yondo 1 was spudded in March of 1941, being completed in August, 1941, from the regular field pro-

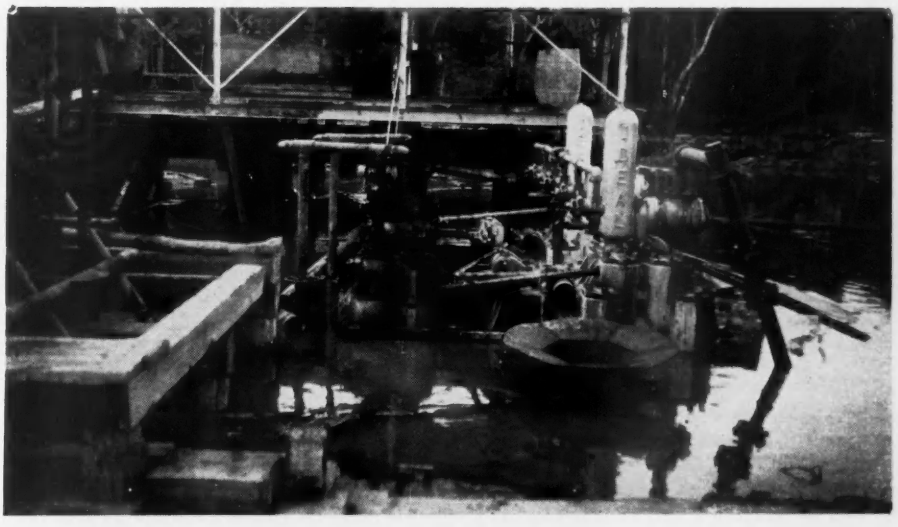
ducing formation. The structure has been identified as a faulted anticline, axis of which trends north-northeast and south-southwest, and is roughly 9 kilometers long and 3 kilometers wide. On the southern end of the field, the terrain is rather hilly, while the north end is swampy and presents interesting operational problems. Located in a bend of the Magdalena River, a substantial portion of the field area is actually below the level of the river at high water, although portions of the river bank itself are above usual high-water level, and the low portions were inundated at every high water period, making it necessary to close down operations at such times. It was not only impossible to drill in the lower part of the field, which comprises most of the producing area, but it was impossible to move in supplies and materials, since it all comes in by river, and is moved to the camp area by roads flooded during the rainy season. A dyke, or levee, from the upper part of the concession past the field area, and elaborate drainage canal systems were constructed, and now it is possible to operate the year around. The ground itself was spongy and unstable, and it now is showing some improvement since the water is being kept off most of the time. Even so it will not support a derrick and rig on the usual foundations, and standard practice, found most satisfactory, is to set up derrick and rig on timber mats to obtain sufficient bearing surface. The mat is constructed of two layers of 3-inch by 12-inch boards, the top layer being laid cross wise, and then the derrick footings are bolted to heavy timbers which bear directly upon the mat. Concrete cellars and foundations for pumping equipment are poured after completion of the well.

Two rigs are running in the field at the present time, one heavy steam and one medium diesel-powered, but it is planned that several more will be moved in within the next year. It probably will require in excess of 400 additional wells to complete development of the field as it is now defined. With enough subsurface information available to standardize on practice, and entering the intensive development phase, operators are using several methods to facilitate drilling. Central boiler stations to supply several locations are established, so that boilers do not have to be moved every time the rig is moved, and central mud mixing and supply stations have been installed. Steel mud tanks are used exclusively at drilling wells. Some mud is made at the wells, and following completion is pumped to the central mixing station which has several pits with permanently installed unitized gun stands. Mud reaching the station from the well is put through a series of circulating pits to remove contamination.



Above—Taken from the Magdalena River, this view shows canal used to assemble Shell's pipe line on floats, whence it was towed across. Also shows low relief of the area.

Below—This flooded situation at the rig occurred several times yearly before completion of the levee around the concession on the river side.



Brought to desired weight, it is then available for use on any well. Tanks are being erected for mud reserves. A series of 40 wells is being started in the north end of the field where oil-base mud is being used. This also is prepared in separate pits at the central mud station, and all wells will be supplied from this point.

Normal drilling time for Casabe wells ranges from 18 to 25 days. An occasional rock bit is used, but for all practical purposes the field is drilled with drag bits. The casing pattern here calls for 13⅜-inch surface pipe, with an intermediate string of 9⅝-inch casing set to about 2700 feet. A 6⅝-inch liner with wire rap screen is set below the 9⅝-inch pipe. Commercial services are now available for all electric logging and gun perforating, and equipment is maintained in the field for these purposes.

Little Room for Increase

To date there has been no water disposal or treatment problem at Casabe, and production is run from the wells into field block stations and thence through the gathering system to receiving tanks at the pipe line pump station where two 40,000-barrel tanks are available. The crude is pumped through an 8-inch pipe line across the river to an 80,00-barrel tank at Andian National's pipe line station at Barrancabermeja. Shell's station at Casabe is equipped with two centrifugal pumps powered by automotive type diesel power units and has a capacity in excess of anticipated production for some time to come. The outlet from Barrancabermeja is not too flexible at this time, although Andian's system consists of a double 10-inch line to Mamonal. The capacity is cut down somewhat from its rated 65,000 barrels daily, since it is operated as two 10-inch lines instead of a looped 10-inch. One line is used for De Mares field crude, and the other line is used to batch Casabe crude and fuel oil from the refinery. Capacity is cut to approximately 57,000 barrels daily, leaving very little room for increased production.

Enemy Helped Develop Coevorden-Oost Field

By K. H. R. HOYER and E. L. SICCAMA

AS EARLY as in 1923, oil traces have been found near Corle in the Geldersche Achterhoek (borderland of the province of Gelderland) in a well drilled by the Rijksopsporing van Delfstoffen (Governmental Research for Commercial Minerals). Even before 1915 some weak oil traces were discovered in a few wells in the Peel area (Between Corle and the mining district of Limburg). They were considered of scientific interest only and no further reconnaissance was planned.

However, this attitude changed after Germany started a large exploration campaign in 1930, forced by the difficulties encountered in importing raw materials. As little was known of the geological structure of the subsurface north of the rivers Rhine and Meuse and as there seem to be no reason that this structure would differ substantially from that in Northern Germany, exploration was considered anew and was undertaken by the Bataafsche Petroleum Maatschappij.

Even before starting, it was certain that this exploration would be very costly. With the exception of a very small section in the Geldersche Achterhoek, there are no outcrops of pre-Quaternary age. Of the existing holes, only a few had reached the Upper Cretaceous. Another question to be solved originated from the impossibility to keep secret the results. It could be legally arranged that competition was limited. By act of November 1, 1933, no wells may be drilled without permission of the government. The BPM secured leases for 12 holes before 1940. Later, a general permit for ten years was granted, and the area meantioned for research enlarged, with the proviso that, under certain circumstances, three extensions of five years could be granted. The BPM, by the same agreement, had to continue drilling with at least one outfit of a certain capacity and had to provide the government with well profiles, samples, and geophysical maps. On request, after certain periods, the BPM had to release parts of the explored area.

Taken from *De Ingenieur* of February 22, 1946, slightly condensed.

After the liberation in 1945, the BPM applied for a new concession, which only contains the Coevorden anticline, as a prospecting producing field. As soon as the concession was issued, a general gravimetrical reconnaissance started out. While this was getting under way, it became known that results in Northern Germany were unsatisfactory. Indeed, a large number of structures were found, of which most were salt domes, but it was obvious that tectonical uplifts result from many small movements, so that many unconformities occur. Oil accumulations have been eroded in an early stage. Only a few of the many structures were poorly producing, and the German government could only make the output profitable by its policy for imports and prices. A corresponding economical situation was not expected in Holland. However, from 1937 to 1939, 12 exploratory wells were drilled in the north and eastern parts of the Netherlands, with depths varying from 1300 to 3450 feet.

One of the results was the discovery of a fairly wide upbend in the Tertiary and Cretaceous in an east-west direction between Coevorden and Meppel. In the Upper Cretaceous, marls and soft marly limestones were reached. No oil traces were found. The capacity of the Conrad outfit with counterflush was not sufficient to reach the layers, which in Northern Germany sometimes are oil-containing. There are sands in the Lower Cretaceous and porous limestones in Upper Jura. This was the situation in September, 1939, when war broke out. With the drilling crew mobilized, all activity was stopped.

Germans Show Interest

Shortly after the occupation in May, 1940, the Germans showed interest for the possibilities of our borderland. In October, 1939, a long blowout had resulted from a drilling near Bentheim on the Schüttorf structure. The well had reached Zechstein at 5200 feet. This structure continues on Dutch territory. More to the south, the Gronau structure crosses the border likewise in a western direction. Furthermore, the Germans had extended their geophysical exploration to the boundary near Coevorden and Schoonebeek and had probably found indications of more uplifts. The results never became fully known, but it was reported in August and September, 1943, that two small oil fields were developed.

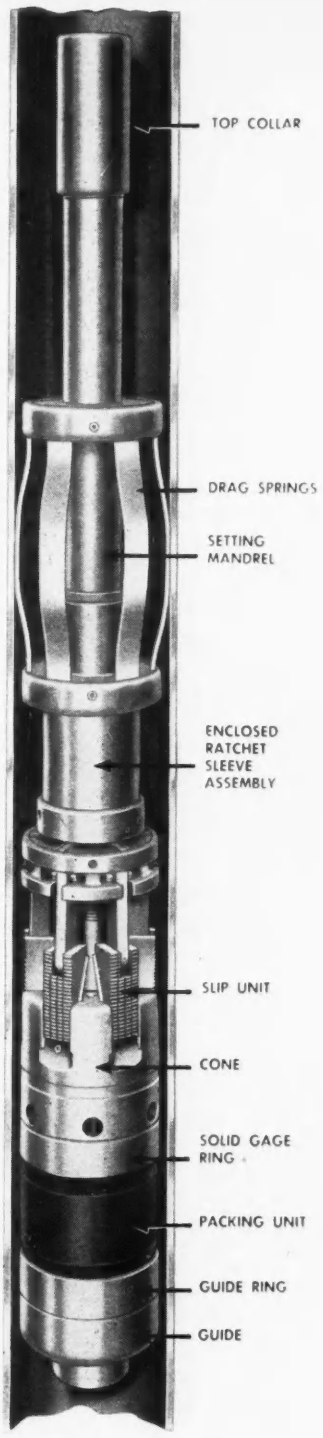
So, the Germans, headed by the "Erdölbeauftragter" of their four-year plan, Professor A. Benz, found reason enough to be interested in this side of the frontier, and on October 25, 1941, they forced the BPM into an agreement with the German Cy. "Elwerath." It could be arranged that the exploration remained in Dutch hands.

Exploration Areas Extended

An article of this scope can only give the main facts. It cannot give a complete review of all considerations involved, the used arguments, the details of the carrying out and the technical-troubles, cheating and sabotage. A detailed geophysical exploration was extended to Twente, the borderland where he Schüttorf and Gronau structures enter our territory. Torsion balances, and soon after that refraction work, were in operation and later reflection shooting was added. The seismic field work was carried out by a German firm. Still later a magnetometer survey was started. Gradually the exploration areas has been extended to all the Netherlands north of the river Meuse. When liberation came, this program was completed for the better part.

Exploratory drilling was started in Twente. It was of special interest to get information about the structures under the Tertiary and the Albien transgressions. It has served, too, as a means of interpreting geophysical data elsewhere with increasing certainty. This drilling survey was extended to the Western provinces. Results cannot be published. The first test well was located at about 1.5 miles northeast from Coevorden as C1. Its location was based on the geological information received from the prewar drillings. It was drilled to 4000 feet, where it had reached the Jurassic (Muschelkalk). The formations of Lower Cretaceous and Upper Jura, which may be oil bearings, are completely absent. The next potential oil containing formation, viz., the Vechstein, was beyond the capacity of the used outfit. No oil or gas traces were found.

Meantime, German geophysical exploration had found an important structure along the frontier. Evidently this was the Eastern elongation of the anticline upbend, discovered by the BPM west of Coevorden. The structure now was examined in detail, especially seismologically, and it was found that it had a flat, wide apex near the village

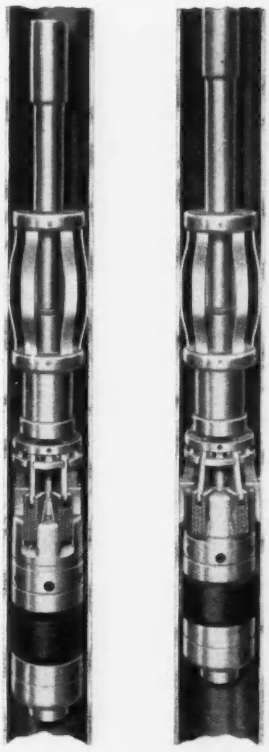


SAFE, POSITIVE OPERATION

The Cementer is connected to the running-in string by a Baker Retrievable Cementer Circulation Joint (Product No. 468) and lowered to a point about four feet below the desired setting point to compensate for telescoping the Circulation Joint. The running-in string is then rotated to the right sufficiently to insure at least one-third turn at the bottom and release the ratchet actuating mechanism. A strain on the running-in string now sets the Slips to prevent any upward movement of the Cementer, and this strain is increased to expand the Packing Element and provide an effective seal. The Cementer is now ready for the cementing operation.

To release the Cementer the pressure is bled off and the running-in string lowered to permit the Packing Element to contract and the Slip Units to retract. Left-hand torque is applied to re-engage the ratchet actuating mechanism and lock the tool in retracted position for removal.

Complete details on the Baker Model "RT" Retrievable Cementer (Product No. 411-RT) are available from any Baker representative.



In running-in position | In expanded position

Baker Service Representatives in All Active Areas.

BAKER OIL TOOLS

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BAKER
RETRIEVABLE CEMENTER

TABLE 1

Stratigraphic Table of Coevorden-East (depths are roughly given)

Quaternary				330′ loose sand and gravel
Tertiary				1150′ very sandy and sandy clay
Cretaceous	Upp. Cret.	Turon		260′ limestone, white
		Cenoman		500′ marly limestone, greenish, white-gray
	Albian	Albian upper		440′ clay and marl, gray-green, reddish brown, flamed and dark gray.
		middle		
		lower		
		Transgression		
		Hauterivian		70′ conglomeratic sandstone, changing into clay.
		Valangian		90′ loose sand, oil containing
	Wealden			360′ shale, dark gray, numerous limestone banks.
Jura	Malm (Portland)			500′ marly limestones and banks of oolithic limestone in places oil containing.
		Transgression		
	Lias			1070′ limestone, dark gray to black
Triassic	Keuper			not yet reached in Coev. East
	Muschelchalk			
	Buntzandstein			
Permian	Zechstein	only in C 1		

Schoonebeek. A second well was brought in November 25, 1942, at about 4½ miles east from Coevorden as C2. At the end of February, 1943, oil traces were found in porous limestone at 3100 feet in Upper Jura (Portland). This was confirmed by electrical logging. This well was completed in April at 4100 feet in the Lias formation. In July, 1943, regular production of one ton per day was established, after setting up a pumping installation. The oil can only be used as a fuel.

After a fairly long exchange of views, it was decided that the potential field would be further investigated by locating a well on the northern slope of the structure. This well was spudded as C3 on September 11, 1943.

In the middle of January, 1943, even before the discovery of oil in C2, the German Cy. "Wintershall" started building a rig just across the frontier near the village Emlichheim. It started drilling May 27, and it became known in August that a fairly thick oil sand was penetrated with an estimated production of 40 tons per day (a ton is equivalent to about seven barrels). Though this output for a first well is very moderate, and the oil, like in C2, very heavy with only very few volatile constituents, it was important under the circumstances. The Germans insisted on a quick exploitation on Dutch territory, as close as possible to E1.

At the beginning of November, the oil sand of E1 was found to be present in C3 at 2650 feet in the Under Cretaceous (Valengien). The sand layer is rather thick, with very fine and loose grains. A formation tester and an electrical log could only confirm the sand. Production was estimated to be 35 to 40 tons daily. This made it certain that an oil field of considerable extension but with a small output per well and with oil of inferior quality was found.

C3 was continued and completed at a depth of 3700 feet in the Lias formation. The oil-bearing layer of C2 is absent. The hole was refilled to 2750 feet and a screen with fairly large slots, 2 millimeters, placed in the oil sand. It was only after July 10, 1944, that C3 came in regular production. The oil (very viscous) is flowing; the production was cut down to 20 tons per day. As was hoped for and expected, production dropped to ⅔ tons daily against the end of September, because of the entry of sand into the well. Moreover, it became evident that the tubing had been clogged by paraffin.

Germans Active

On the German side of the boundary, there was an uninterrupted activity. In April, 1945, when they were driven out of the field, about nine wells had been completed, of which seven were producers. Because of the entry of sand and probably by the depositing of paraffin in the tubings, the production, however, did not exceed 55 tons daily.

The next well on Dutch territory was brought in as C4 on June 30, 1944, a quarter mile farther north on the flank than C3. Due to chaotic conditions at the German fronts, however, all activity was stopped. C4 was completed after the liberation and came into production on June 28, 1945. The production was in the beginning equal to that from C3, but by special measures, it could be kept constant. Another outstepping well, ¾ mile southeast of C3, from collected German and Dutch material, was brought in as C5 on July 18. It penetrated the same oil sand so that a field of satisfactory extent has been proved.

The determinations in Table 1 are based on petrographic characteristics and on micro fossils. Some typical color changes of the cuttings in the mud fluid facilitate orientation during the drilling operation. Because of the war, only the first wells have had an electrical log. The structure is probably fairly simple, broken by a few faults. Presumably, its shape is best expressed in the Zechstein with salt layers, not yet reached.

The northern and eastern extension of the field are still completely unknown. However, all exploration has been stopped and activities are concentrated on the increase of production. The southern limits were perhaps reached by the Emlichheim wells, and the western line is more or less defined by C2, because of the missing of the first oil bearing formation. In the wells on Dutch area, no edgewater was found.

New exploitation wells are located near C3 and C4. They are completed with 9⅝-inch casing to 830 feet and 6⅝-inch waterstring above the oil sand. The 4¾-inch screenpipe has 0.7 to 0.5 millimeter slots. Attempts are made to modernize all equipment, as the German-made valves are of unnecessarily heavy construction, which hampers quick moving to new locations.

At the beginning of 1946, there were only three producing wells. Two were flowing and the third a pumping well. The tendency to flow is not strong, so that all new wells will be supplied with a pumping outfit.

The flowing wells tend to produce a film of paraffin in the tubing. After hoisting of the C3 well, the string was at 1000 feet completely clogged with tough paraffin. The same trouble occurred in connecting pipe lines at the surface. A boiler was built to heat the oil before transportation by truck. The projected four-mile, 6-inch pipe line to a canal will be isolated and the oil has to be preheated before pumping and the line cleaned with warm water afterwards. This pipe line will connect a projected central storage tank with the canal from where 150-180 ton barges ship oil to Amsterdam. Because of lack of ironplate, oil is now partly stored in open concrete reservoirs.

Production in 1943 was 200 tons (about 1400 barrels), 1944, 1750 tons (about 12,250 barrels) and 1945, 5850 tons (about 40,950 barrels). From June, 1945, with 100 tons (about 700 barrels), production jumped to 1000 tons (about 7000 barrels) in July. Material shortages kept the increase from being more pronounced. The oil is very viscous, congeals easily, contains much paraffin and very little volatile components. Specific gravity at 15 C. is 0.905. Gas is negligible.

Like everywhere else, there is a great shortage of housing. An old butter plant is made to fit the workshop and a small store. A new training for drillers is under way. The total staff will exceed 200 men in the near future.

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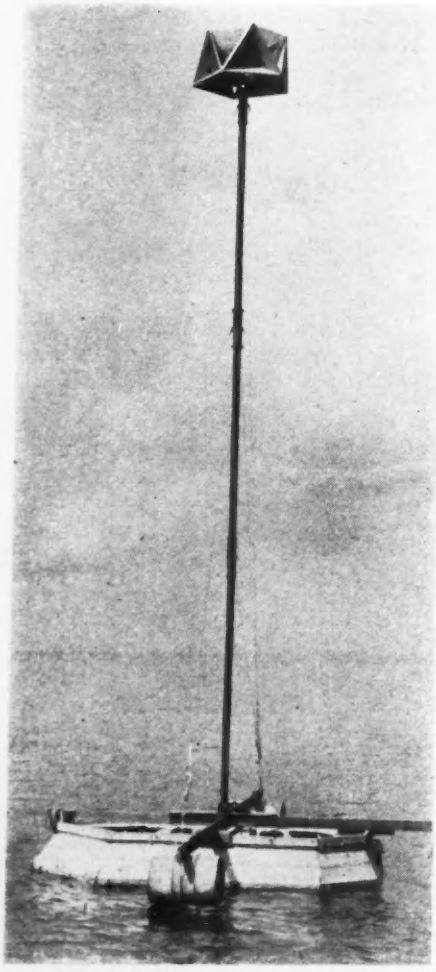
Bahamas Underwater Search For Oil

The Stamba, above, which recently sought out enemy submarines for the Canadian Navy, now plies the blue waters of the Bahamas in search of petroleum in the rock and sand beneath the ocean floor. The vessel is the first to use radar in the hunt for oil. At the stern rests a two-ton diving chamber in which petroleum scientists map the ocean bed.



This radar target, one of several at strategic points over the 2000 square miles in the Bahamas. Radar arrays atop the 25-foot masts are picked up on mother ship's radar screen, enabling navigator to determine exact position.

RADAR GIVEN A NEW ROLE

BENEATH the surface of some 2000 square miles of blue water in the northwestern Bahamas, petroleum scientists are seeking indications of possible new oil fields. Equipped with a diving chamber and using radar to plot their position, they are mapping rock and sand formations far below the ocean bed.

Pictured on these two pages are some of the men and equipment engaged in the marine exploration conducted by Standard Oil Company (Bahamas), a subsidiary of Standard Oil Company (New Jersey). For periods of six weeks, the scientists and crew live aboard their 112-foot ship, the first craft ever to be equipped with radar in the search for oil. Then they return to their island camp for a rest.

The use of radar permits the geophysicists to plot the site of their tests with improved accuracy. Radar targets, 25 feet high, are located at strategic points in the exploration area. Picked up on the radar screen aboard the mother boat, the targets enable the navigator to determine his position.

At various locations, engineers lower a two-ton diving chamber from the ship's

Atop the mast of the Bahamas exploration ship is the radar wave guide. Targets as far as 18 miles distant are picked up and recorded on the radar screen, enabling the navigator to map the testing sites with accuracy.

The diving chamber is a key instrument in the search for oil beneath the waters of the Bahamas. Emerging from the chamber is Dr. R. J. Watson of Tulsa, manager of the exploration group of Standard Oil Company (Bahamas). With him are C. F. Sellers, left, in charge of the diving chamber and underwater gravity work, and J. Pollard of the exploring group.

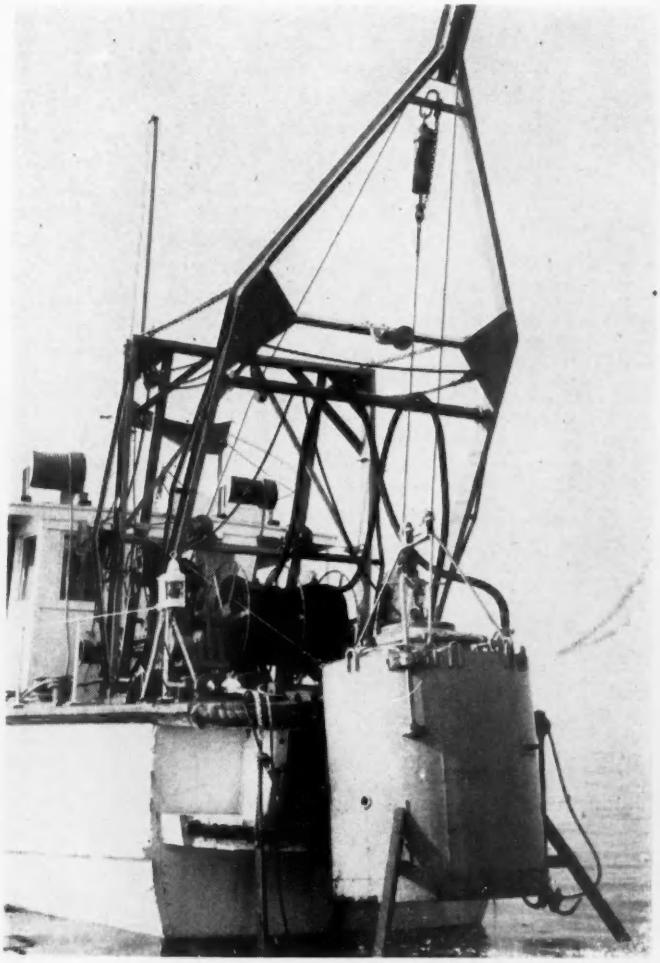
stern to the ocean bed. Inside, an operator uses a gravity meter which indirectly provides information as to the presence of oil.

If the geophysical reports are favorable, over-water rigs will be erected later for drilling tests.

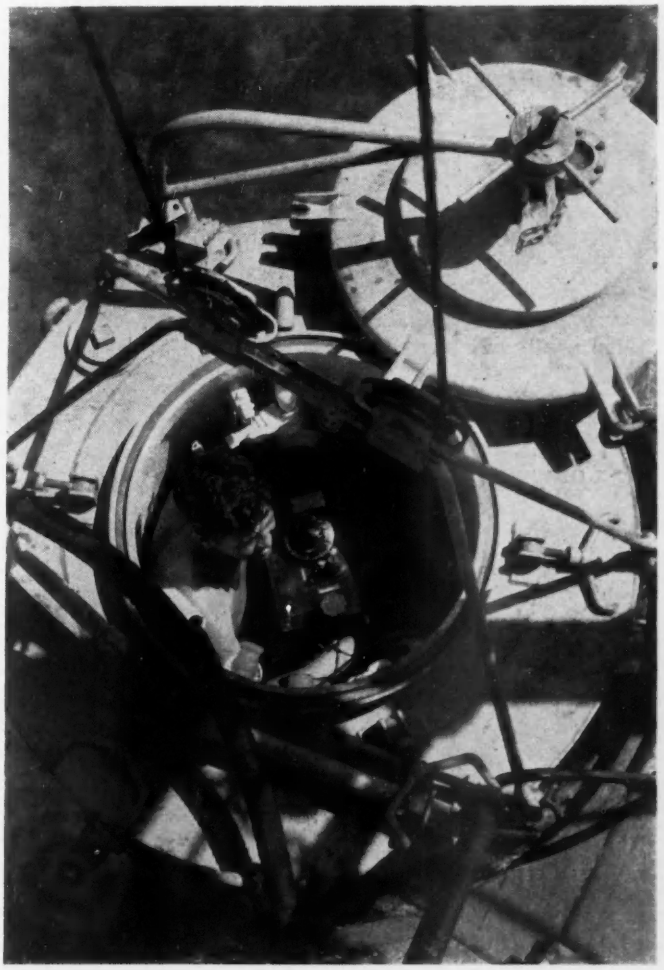
At the present time the only active oil test in the Bahama Islands is a wildcat being drilled by Bahamas Oil Company, a subsidiary of the Superior Oil Company of California. This test, spudded last April, is projected to 10,000 feet. It is located in the approximate center of the northern end of Andros Island about nine miles from the mouth of Stafford Creek.

Anglo-Bahamian Petroleum Company is also conducting exploratory activity in the Bahama Islands and drilling is expected to begin early next year.

A two-ton diving chamber, below, is lowered from the exploration ship in waters of the Bahama Islands. Inside the six-foot-high chamber, a scientist operates a gravity meter.



From the stern of the oil exploration ship, the diving chamber is shown below, returning from a trip to the ocean floor. Beside the operator is a gravity meter. Two thousand square miles are being mapped.



OWNED IN FEE—

New Oil Strike In Colombia

Company amphibian tied up at floating dock to discharge cargo at Puerto Nino. This plane makes three trips weekly to field operations.

LITTLE doubt is felt in Colombian oil circles that Texas Petroleum Company will open a new field in the Magdalena Valley, the first field for the Upper Valley, and the first field uncovered in Colombia by the company.

Valesquez 1, the apparent discovery, also is the first well to be drilled in the country by the company, although Texas Petroleum Company was one of the initial American companies to become interested in Colombia.

Circumstances connected with acquisition of properties for drilling prevented them from actually starting a well of their own before the present operation. An organization has been maintained here for 20 years or more and now an active wildcat program is actually under way, and the company has sufficient properties in various parts of the country to keep several rigs busy.

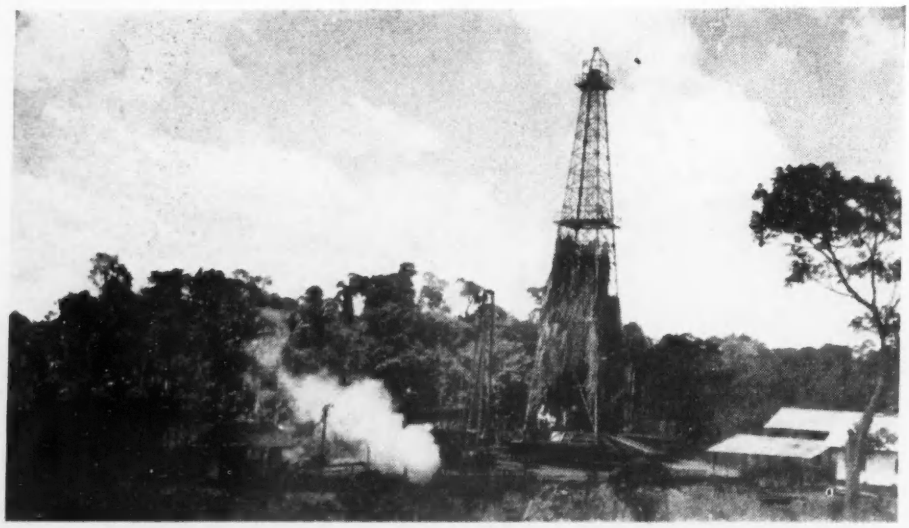
Commercial Shows

The Velasquez 1 was drilled to 8455 feet, reaching this depth at the end of July, where it had gone 5 feet into the basement granite, one of the objectives as an exploratory well. Decision had been reached to set casing for later production tests long before this depth was reached, but operators did not want to set the casing before running electric logging survey and dip meter, and drilled ahead after sands had already been cored which gave every indication of commercial production. Showings started at a depth of 6500 feet, at which time it was believed to be in Tertiary formations, and several drill stem tests were attempted. Shows of oil were recovered but none of the tests was considered good mechanically. Best test was at 7254-74 feet where on a 13-minute drill stem test, 15 stands of clean, 31-gravity oil were recovered. Sand bodies were found on down to below 8200 feet, all with showings of oil or gas, and then showings were found at intervals on down to the bottom of the hole, but no further tests were attempted. Something like 100 feet of conglomerate was drilled and cored just above the basement, and oil stains were noted in this as well, so that after getting surveys run and landing the 7⅝-inch casing at 8265 feet, it was decided to run a test in open hole below the casing seat which test was being made recently. The formations encountered in this well have checked closely with those in a wildcat drilled some distance up the river by Richmond Petroleum Company. The Richmond well had showings also, but were of heavy oil, almost tar, and failed to produce on tests.

Texas Petroleum Company plans a series of tests in various sand sections noted through coring and electric logging, and it will likely be some time before the well is completed. However, if good production is obtained, it may be allowed to produce and further studies made in other wells.

The company has a good start here to commence active exploitation of a producing area, having a semi-permanent base camp already constructed with quarters, and mess halls sufficient to take care of a few more than those needed on one wildcat. The present setup includes a road from Puerto Niño, the receiving port on the Magdalena River, 15 kilometers back to the well and campsite. Heavy equipment comes by river boat and barge, while many items are flown in by the company's plane from Bogota or Barranquilla, landing on the river at Puerto Niño.

Texas Petroleum Company's Velasquez 1, potential opener of the Upper Magdalena Valley's first oil field.



Fee Ownership

The tract upon which the well is being drilled is owned in fee by the company. In Colombia, ownership in the minerals on and under property belonging to private owners, is vested in the private owners only if the land was granted to private individuals prior to October 28, 1873, the effective date of the decree whereby the government assummed ownership of all minerals. This particular property, known as the Teran-Guaguaqui property, was purchased by

Administrative Office-Bunkhouse and Messhall at Camp Calderon near Velasquez 1.

The Texas Company from Jorge and Ernesto Salcedo Salgar in February, 1929, and title examinations had indicated that title to the property had been upheld by the Supreme Court in a lawsuit, 1904-1907. Following surveys, the company filed notice of intention to drill the first well on May 7, 1937, at which time it was announced that the well would be started by January 15, 1938. Drilling equipment was then available for the well, but following considerable delay in obtaining final approval it was not until January 9, 1939, that the approval of the Ministry of Mines and Petroleum was obtained, a year and eight months after filing, and a year after the announced spudding date. In the meantime the drilling equipment, urgently needed elsewhere, had been sent to Argentina.

Since the intended date for which approval had been given had already passed, it was necessary to file another notice to clear the record.

Meanwhile before a rig could be obtained, World War II caused further delays, with the result that actual work of setting up the rig did not start until June 8, 1945. The well was not spudded until December 8, 1945. Shows of oil came in May, five months later.

Clear Title Given

Among the delays was an investigation in 1935 when an attack on the chain of title was threatened which would have left the title to the surface with the company, but title to the minerals vested in the government, since any flaw in a private title, by Colombian law, causes the minerals to revert to the state. The investigation was not instigated by the government, but was threatened by private parties. The case was handled by Dr. Bernardo J. Caycedo, head of the company's legal department in Colombia, and clear title was certified by the Council of State on October 13, 1938.

At the same time, the Ministry of Mines and Petroleum had insisted, following receipt of notice of intent to drill, on a further careful study of boundaries and titles to the land, and in order that matters be facilitated, the company informed the Ministry that this notice would not apply to a portion of the eastern side of the tract, the locality where boundaries had been questioned. However, the questioned area does not include any substantial part of the Teran and Guaguaqui properties which were in two original adjoining tracts and comprising together 163,108 hectares (407,000 acres). The disputed part amounts to about 11,000 hectares (27,500 acres) on the extreme east, farthest from the well.

Being on private fee lands, any production will not be subject to payment of royalties, but will be subject to taxation. However, taxes will only amount to something like 1 percent in this location.

In addition to this property, in the extreme western part of the Department of Boyaca and bounded on the west by the Magdalena River, The Texas Company owns 6000 hectares (15,000 acres) of fee land in the northern part of the Department of Tolima, and holds leases from private owners on an additional 14,000 hectares (35,000 acres) in southern Tolima. Other property held by the company for oil exploration and development was acquired through government concession.

The company has only one heavy steam rig on the Teran-Guaguaqui freehold, and will concentrate the balance of available equipment on an active wildcat program. Counting this rig they have two other extra heavy rigs in the country, one medium-to-heavy power rig already in, and another extra heavy power rig which was scheduled for delivery in Barranquilla recently. So by January 1, 1947, there should be four rigs drilling on wildcat operations in addition to the rig used for continuous development in the Velasquez area should it be productive.

Wildcat Program

Wildcat work already laid out includes a 12,000-foot wildcat test on the Remolino concession in the Lower Valley near Barranquilla in the Department of Magdalena. Roads are being surveyed, rig is to be moved in from Barringquilla it it is expected to spud by some time around the first of the year.

An extra heavy power rig is on the ground at El Tablon, a concession in the Department of Bolivar, due east of Socony Vacuum Oil Company's Sinu field, and midway between that field and the Magdalena River. Derrick is being built, camp is being constructed and the well, to be spudded in soon, is scheduled to be carried to 12,000 feet.

The new heavy rig is scheduled to drill a 12,000-foot wildcat on the Pinto prospect in the Lower Valley country west of Tropical Oil Company's Costa Rica wildcat in the Department of Magdalena. If delivery is not held up it should be drilling by shortly after the first of the year.

A medium duty power rig is being held in Barranquilla awaiting final government approval on a concession in the Department of Caqueta, in the lower part of the Llanos area, where a series of wells are scheduled to be drilled to depths between 3500 and 5000 feet. Although this area is popularly referred to as the Lower Llanos, being across the mountains in the southern part of the country, actually it is not Llanos, being broken jungle-type terrain lying a considerable distance southwest of the area known as the Llanos. Two geophysical crews are working in this area, one a company seismograph crew, and the other a commercial crew working under contract to the company.

Patience, Faith, Money and EFFORT

Oil Hungry Canada

By OLIVER B. HOPKINS

Vice President, Imperial Oil Ltd., Toronto, Ontario

PRODUCING approximately 15 percent of her total crude oil requirements and having less than one-tenth of one percent of the world's proven oil reserves, Canada is an oil-hungry nation. This vigorous member of the British Commonwealth is now engaged in the most intensive oil exploration program in its history. With industrial expansion moving apace, Canada is straining every sinew to increase its oil production and to meet the growing demands for motor fuel, lubricants and other petroleum by-products. Encouraged by government tax concessions for purely exploratory work, the drills are ceaselessly probing for new oil.

In the van of this ambitious program is Imperial Oil Limited which last year contributed more than 29 miles of wildcat drilling in addition to 25 miles of hole in proven fields. This company and its subsidiaries produced 2.67 million barrels of Canadian crude. With refinery runs averaging 105,000 barrels daily the company imported the balance of its requirements from the United States and South America.

Two Main Fields

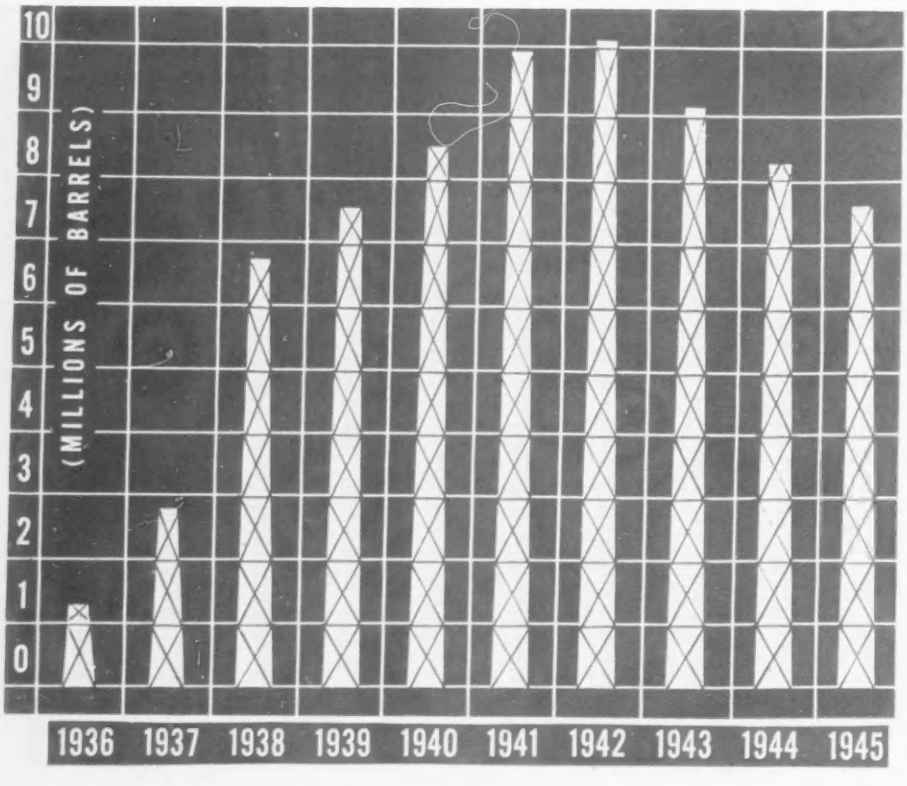
Canada's reserves are chiefly in two fields—Norman Wells in the Northwest Territories, and Turner Valley in Alberta. Norman Wells is so remote that it is not economical to transport the crude southward to larger centers of population unless greater reserves are created. Turner Valley production is declining. It reached its maximum crude production of 28,410 barrels per day in February, 1942, and has since dropped to around 20,000 barrels per day. However, declining supplies in this area coupled with plans for the increased use of petroleum in the postwar years have provided the stimulus for the most extensive exploratory program ever undertaken in the Canadian west. Survey and drilling employing 60 rigs as well as a number of seismograph crews are now operating in the region and a million dollars a month is being spent in new development.

Canada, with her modern and progressive industries and her high standard of living, is a great user of oil. On a per capita basis Canadians use more petroleum than any other people in the world except the citizens of the United States. Therefore, she must turn to foreign fields and, inevitably, she must add the cost of transportation to the final cost of her petroleum products.

Fortunately much of Canada's demand can be supplied by water from South America and from the U. S. Some American crude can be brought in by pipe line, as is done at Sarnia in Ontario Province, which is near Detroit, Mich. Boat and pipe line are the two cheapest forms of oil transportation, and Imperial is able to take care of about 80 percent of its needs by these means.

The remaining 20 percent, however, is required for the inland Regina and Calgary refineries, where it must be delivered from local producing fields or else moved long distances by rail at high cost. There is, of course, the alternative of supplying the prairies with waterborne crude by rail from Churchill on Hudson's Bay, or from Vancouver, but costs would probably be higher than from the United States sources in the case of Vancouver and the difficulties of the Churchill route are well known. Transportation costs on crude oil which is brought to the prairies are an important factor in the ultimate price of products.

Prior to 1936 crude oil production from Turner Valley was negligible and most of the crude used in the refineries in Alberta and Saskatchewan was imported from fields in the U. S.—the



Crude Oil Production, Alberta, Canada, 1936-1945

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These latest developments in O-C-T well completion and flow control equipment were designed by practical well men and engineered to avoid such unsound practices as: sealing by field welding without stress relieving facilities, removal of drilling control units before casing is sealed, exposure to high well pressures of large areas within the surface fittings, exposure of vital metal ring gaskets to corrosive fluids and gases, and others.

Note that all seals in the assembly are of resilient material and of proven mechanical design. Compression may be applied to the tubing and casing hanger seals externally by means of screws in the flanges. The "O" seal rings in the lower portion of the tubing head have been subjected to 15,000 lbs. pressure to test their design. Note, also, that the vital API metal ring gaskets between flanges are protected against corrosive fluids and gases by means of these resilient seals and that high well pressures are confined to the bore of the tubing head.

Operators responsible for the selection of well completion equipment are urged to study carefully the numerous sound and exclusive features developed in these new O-C-T well heads and flow control manifolds.

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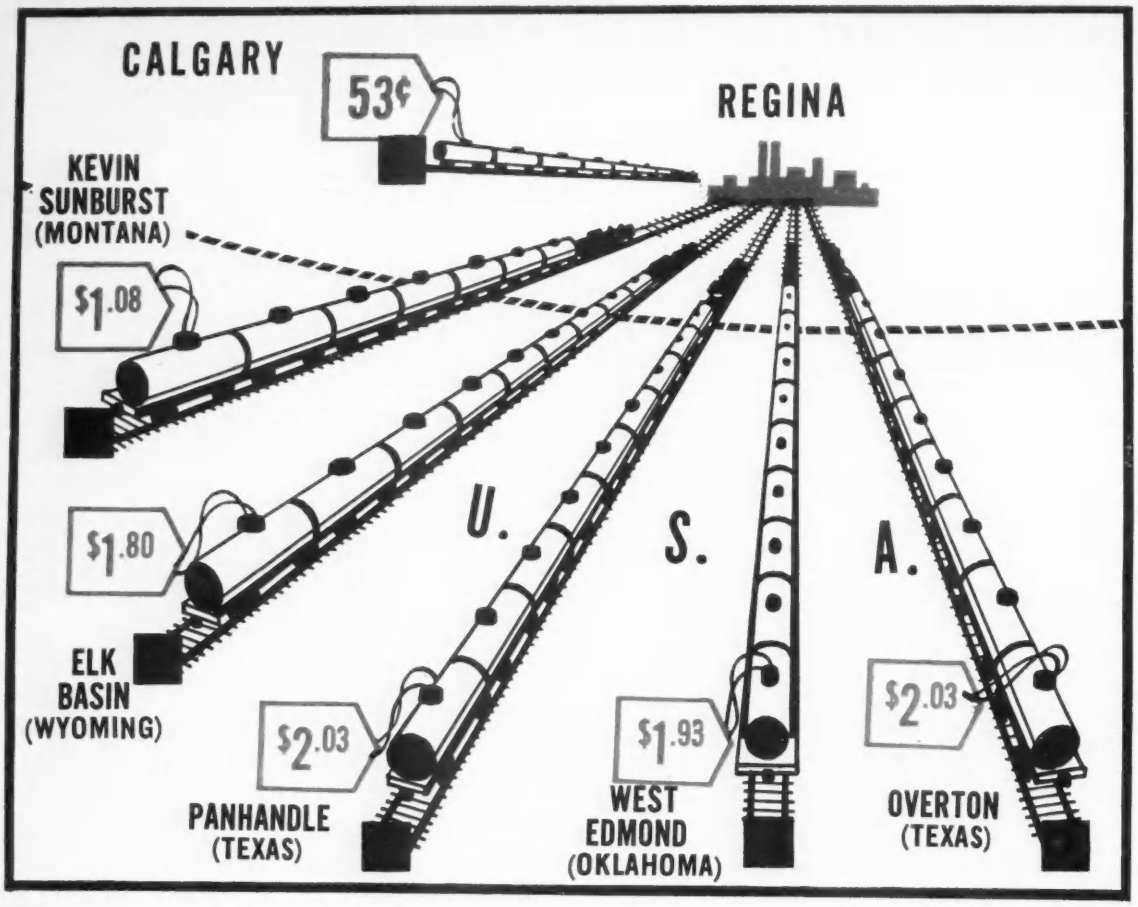


Relative freight charges per barrel of crude oil from various points in the United States to Imperial Oil Limited's big refinery at Regina.

(All charts and photos, Courtesy Imperial Oil Limited)

greater percentage of these imports being from the nearby "Cutbank" field in Montana. The price of gasoline was governed by the cost at the well of this imported crude, plus the cost of transportation. In 1936 the tank wagon price of gasoline—the price to the dealer—was 21.5 cents at Calgary and 22 cents at Regina.

By early 1937 Turner Valley was producing enough crude oil to displace, to some extent, imported crude in Alberta refineries, and by the end of 1937 was starting to displace imported crude in Saskatchewan as well. As a result, at the close of 1937 tank wagon prices had dropped to 17.5 cents at Calgary and 20.5 cents at Regina.

Crude Up, Gasoline Down

Alberta crude production rose steadily, and gasoline prices kept dropping accordingly. By 1941 Alberta crude had displaced imported crude entirely in both Alberta and Saskatchewan and, at the close of that year, tank wagon prices were 16 cents at Calgary and 18 cents at Regina.

Only in 1941, however, did Alberta crude supply the total requirements of both Alberta and Saskatchewan for, due to wartime demands, the prairies' need for petroleum products rose steadily, the demand in 1942 being almost three times as great as in 1936. Despite the fact that Alberta reached its peak of production in 1942 Saskatchewan imported more than one million barrels of oil in that year. The demand kept rising, but in 1943, Alberta production started to drop off and the result was that more and more oil was imported into Saskatchewan until, in 1945, imports exceeded 5 million barrels.

For their war effort, the oil companies had to go farther and farther into the U. S., for the Montana fields were able to supply but a fraction of the requirements. This meant much heavier transportation costs—in some cases as much as $1.93 per barrel was paid for transportation alone on oil imported into Regina.

Ordinarily this large-scale resumption of imports would have meant that the price of gasoline would rise in Saskatchewan, but Canada was at war, and price ceilings had been set. To hold the price, the Dominion government paid subsidies to the refiners in Saskatchewan to help cover the increased cost of importing crude oil.

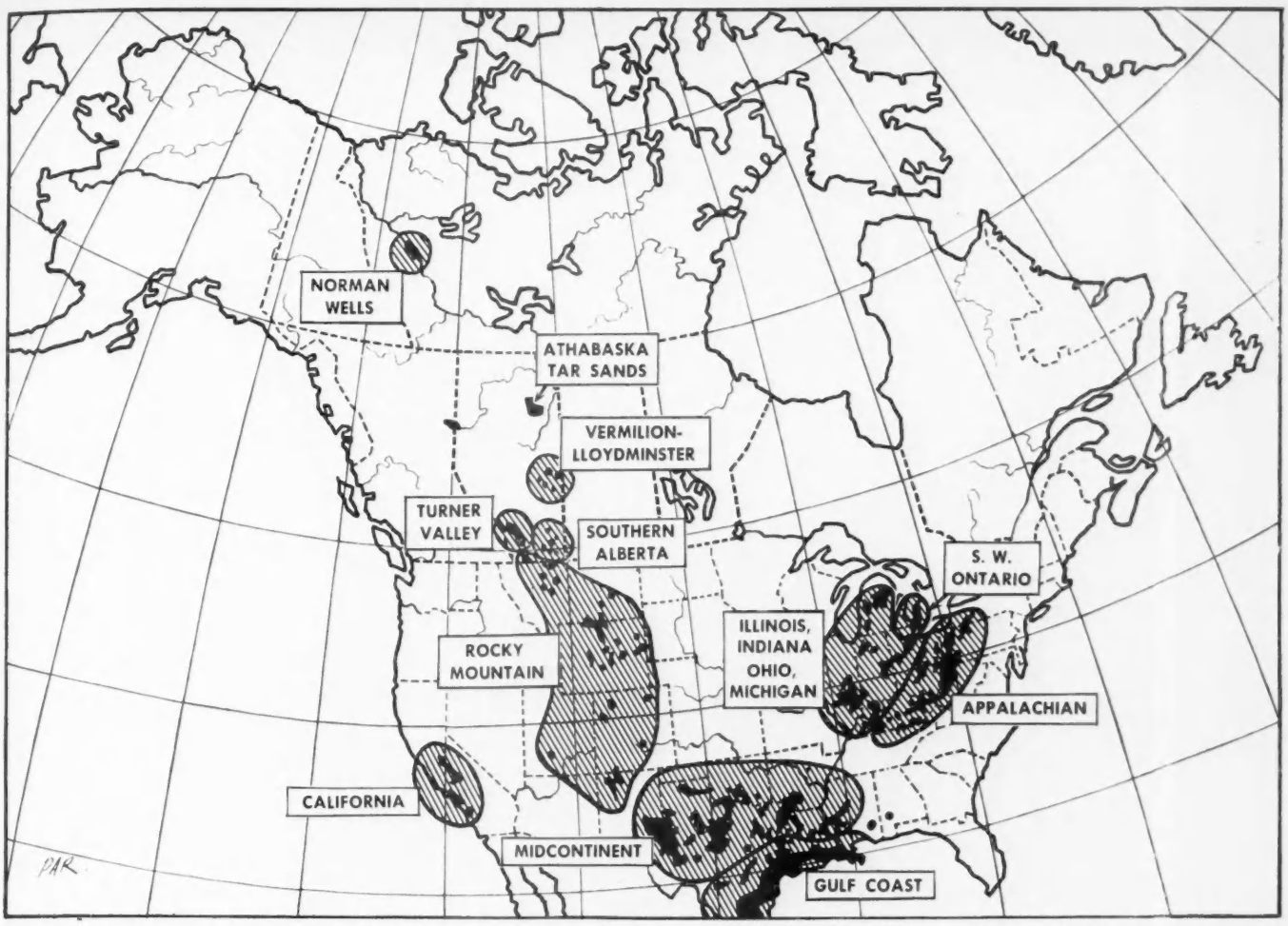
Now, the war emergency being ended, the government has reduced the subsidy on imported crude oil with the result that the cost has been increased by 45 cents per barrel. A corresponding increase in the price of Alberta crude oil has been allowed to maintain the status quo.

In spite of greatly increased efforts by many companies to find more oil in Alberta, production is dropping off, and producing costs are rising. Production in 1945 was 7,642,900 barrels compared with 10,157,398 barrels in 1942—a drop of 2,514,498 barrels—and it is urgent that more oil be found. The cost of exploration and drilling is heavy. In the plains area there are few outcroppings of rock to guide the geologist and consequently costly geophysical methods must be used; in the foothills the formations that may contain oil are deeply buried—more than two miles down in some cases—and drilling is unusually difficult because of the nature of the rocks that must be penetrated.

Effects of Discovery

A striking, if somewhat exaggerated, example of the effect of the discovery of an adequate local crude supply occurred when oil was found at Fort Norman. Production was obtained from three wells near the banks of the Mackenzie River following the original discovery in 1919. A small skimming plant was built to produce gasoline for the benefit of the few fishermen and trappers in the area. As a result the price of gasoline dropped from $2.50 to 90 cents and more recently to 30 cents per gallon. Of course the distances, figures, and types of transportation involved are not applicable to the whole of Canada, but the principle is the same.

It might be thought that we should make the best of an unfortunate situation and find consolation in the fact that at least oil is available to us on the prairies



Areas favorable for oil production in the United States and Canada. Light shading shows former sea beds which provide favorable sedimentary conditions for oil accumulation; medium shading indicates areas where oil is known to exist. Present oil fields are shown in black.

from U. S. sources. Oil fields, however, are diminishing assets; once the oil has been taken out of the ground it is not replaced. During the war the oil industry in the U. S. made a tremendous effort in supplying the sinews of victory. In 1945 world production of petroleum amounted to 2.75 billion barrels, and of this amount the U. S. supplied 64 percent. The U. S. as a measure of self-protection, must exercise some caution with regard to her remaining reserves. By the same token it behooves Canada to pursue the search for oil with added vigor.

Cost of Synthetic Processes

Of course there is the possibility that synthetic processes may come to our aid. There is the Fischer-Tropsch process which was used by the Germans to convert coal into petroleum products and which may be used to convert natural gas into gasoline and other products. This process is still largely in the experimental stage on this continent, and its utility will only be determined on a cost basis. If the cost of synthetic production is greater than the cost of production from crude transported to the prairies, it certainly will not be utilized. which lie in this process and future decisions must be governed by the economic factors involved. A round-figure estimate of the cost of a Fischer-Tropsch unit of reasonable size in the U. S. has been placed at $25 million.

The vast reserves of oil in the Athabaska tar sands might also be made available. Again the cost factor is, meanwhile, indefinite and may be prohibitive, as any presently known methods of recovering oil from these sands appears to be more, and not less, costly than crude from other sources .

Despite this present rather gloomy picture the prairies, which are today at an economic disadvantage in regard to oil supply, give some indication that they may, ultimately, develop into one of the world's great oil producing areas. The petroleum industry, as a whole, is today engaged upon history's greatest search for oil in Canada and has concentrated on the western plains. Imperial Oil has pioneered this search and is still taking a leading part.

Much has been learned about oil exploration on the prairies since Imperial's first well was drilled in 1917 near Conklin, Alberta, on the Alberta Great Water-Imperial Oil is aware of the possibilities ways Railway. Imperial Oil's first large exploration program was inaugurated in 1919, when 12 geological parties were dispatched to the western provinces. Since that time exploratory drilling, geological surveys and geophysical surveys have been carried on. The company was, of course, active in the original exploration and development of Turner Valley, and was entirely responsible for the development of Norman Wells, Canada's second largest reserve. The company has discovered or assisted in the discovery of various other oil and gas fields. This has involved the expenditure of truly vast amounts of time, money, and labor, but at the same time, from an exploratory viewpoint, we must regard western Canada as a relatively untested area.

Drilling Is Final Test

This may come as a surprise to some, but man's knowledge of what lies beneath the surface of the earth is gained slowly. Oil is found in areas where sedimentary deposits were laid down in ancient seas. Such deposits lie in varying thicknesses from the Rockies far out across the prairies, and from the prairie-U. S. border to the Arctic. In the Rockies they run to a depth of 10 miles of more and, generally speaking, taper off to more shallow depths eastward. In spite of aerial photography, the study of outcroppings of rock and of subsurface

Well in Turner Valley, Alberta, Canada, burning spent acid and oil from the pipe before being connected to tanks.

contours, examination of surface seepages and other geological data in this vast area, it is still necessary to drill, for only by drilling do we get a final test, which may or may not confirm the geologist's hopes. However, from a careful examination of cuttings obtained by drilling, first at one location and then another, it is becoming possible to piece together a pattern of the subsurface geology which may lead to the discovery of oil. It is a rather remarkable fact that, of approximately 1600 holes drilled in western Canada to date, less than a dozen can definitely be accepted as having been drilled deep enough to test all the possibilities of the sedimentary deposits. We need not, therefore, be discouraged if there appear to have been relatively few tangible results from western exploration up to the present time.

Geologically the west might be compared with some U. S. areas which have been partly responsible for supplying its crude during recent years. It is similar in structure and oil bearing possibilities to a great section of the U. S. lying immediately to the south—the states of Montana, Wyoming, North Dakota, South Dakota, Colorado, Iowa and Nebraska. In these states about ten times as many holes have been drilled as in Canada, and the ultimate yield is estimated at about 1.5 billion barrels.

The future of oil exploration in western Canada is bright. This, coupled with the national need for greater petroleum reserves, justifies the large expenditures Imperial has been making. This high cost of exploration is often overlooked. Geological or geophysical surveys, and occasionally both, are expensive as is drilling equipment. The 12,955-foot dry hole which Imperial drilled recently at Coalspur, testing formations, cost about $800,000. In Turner Valley, where producing depths are from 7000 to 9000 feet, a well costs a minimum of $150,000 and there are many producing wells in the Valley which will never repay their original costs.

Nation's Welfare at Stake

From 1939 to the end of 1945 Imperial has spent in exploration in round figures, a total of $5.8 million in Alberta, $3 million in Saskatchewan and, exclusive of the Canol project, $2.5 million in the Northwest Territories. In consideration of the risks involved the rewards have indeed been small. Oil development, if it is to be done on a continuing basis and if workers and all others concerned are to be treated fairly, requires the adequate financial reserves of a strong and healthy business. The company plans to continue its efforts to develop Canada'so latent oil resources on a national scale; in fact, as an integral part of the Canadian oil industry Imperial Oil considers this development work as an obligation which, with the nation's welfare at stake, it cannot ignore.

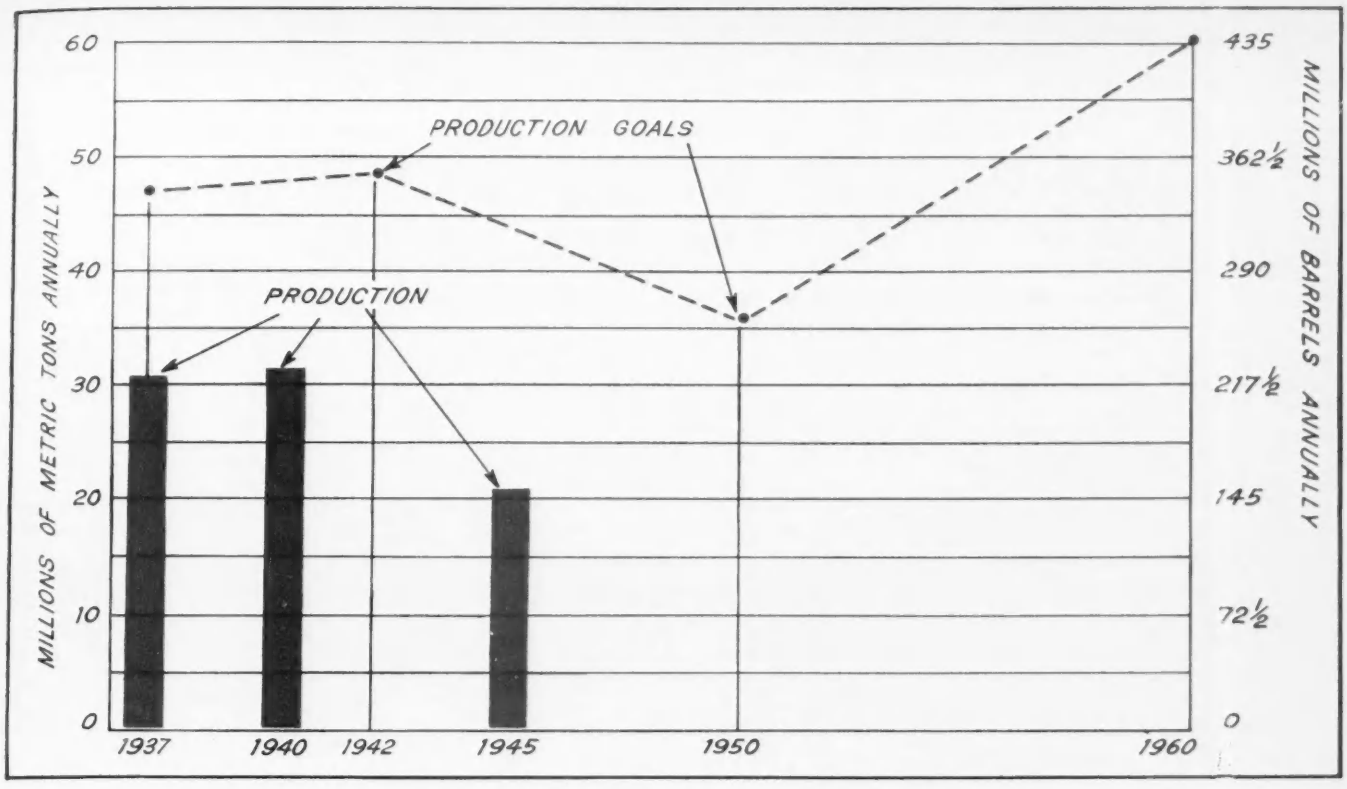
As to the Canol project, this was entirely a wartime development and any criticism of its utility can be met by reminder that the North American continent, at the time of its inception, stood in dire peril from the Japanese entrenched in the Aleutians. Had they succeeded in bringing up greater reinforcements Canol might have powered the defense line against invasion. Its contribution to the operation of the Alcan highway, the fueling of bombers being flown to Russia and other military developments in the Pacific northwest was a vital one.

War's Uneconomical Inroads

The threat of Japanese interference with the tanker movements to Alaska, coupled with scarcity of Allied tanker transport, led United States military authorities to seek a source of petroleum closer to the zone of actual combat. The explorer Steffanson was called to Washington as a consultant in Arctic conditions, and he drew attention to the small oil field developed by Imperial at Norman Wells. Officials of the company were asked to cooperate and they agreed that a vigorous drilling campaign could probably bring production of the field up to 3000 barrels a day. About May 1, 1942, the Canol project was begun with this objective, Imperial being in charge of drilling and oil production. Drilling began on July 4, 1942, and in that year 16 wells were completed, two of which failed to find oil in commercial quantities. When, on March 8, 1945, the order was given to halt operations, 67 wells had been drilled. Of these 60 were commercially productive and seven were classed as dry holes. Four of the dry holes might be considered as wildcats for they were drilled some distance from the productive area in an attempt to extend the field. During the last six months of operation the field produced at the rate of more than 4000 barrels per day.

The Canol project was a development dictated by wartime necessity, and the same is to some extent true of the great impetus which the search for oil in general has received since 1939. All our problems in connection with oil supply were heightened by the war. It made great and sometimes uneconomical inroads into our small reserves. The potential demands, as the war dragged on, were constantly increasing. Even though the war has ended there can be no appreciable lessening of our exploratory endeavors. In fact the opposite might seem to be indicated for our needs are certainly greater today than before the war, while our available sources of supply are lessened in Canada and are farther away in the U. S.

It is obvious, however, that this costly search in the future, will require more than money. It will take time, patience, courage and faith.



U. S. S. R. Crude Oil Production and Five-Year Production Goals

Russia— WHAT'S HER OIL PRODUCTION?

WHAT is Russia's annual crude oil production?

This question is a familiar one both in oil and government circles throughout the world. Outside of the Soviet Union the correct answer has not been found.

However, information now available from Russian sources indicates decisively that estimates made by American governmental agencies, petroleum geologists, economists and others during the war were far in excess of the actual oil produced annually in the USSR. These Russian sources indicate that the oil flow in the USSR has declined steadily since 1941.

Estimated figures by American companies and individuals on Russia's production in 1945 vary from 185 million barrels to 300 million barrels—all greater than figures now obtained from Russian sources.

Andrew D. Perejda, geographer and cartographer in the government service, writing on "The Position of Russia in the Oil Age" in the August, 1946, issue of *The American Review on the Soviet Union*, a quarterly publication of the American Russian Institute, points to the over-estimates made on USSR oil production during the World War II period.

"After a thorough investigation and review of available Russian sources I find that nowhere in them are there any authoritative figures given for the years 1941, 1942, 1943, and 1944—not even estimates," Perejda said.

"There is, however, an estimated crude oil production figure of 238,150,000 barrels for 1941, issued by the United States Bureau of Mines.

Table of Production

"In the accompanying table (Table 1) are production figures obtained from Russian sources (various Russian publications and geological data) for the years 1940 and 1945. The 1940 figure of 226,464,810 barrels is far below the estimated figure issued by the United States Bureau of Mines for 1941, while the 1945 production figure of 148,539,600 barrels is extremely far below any of the estimates made by our geologists and economists, which have varied from 238 million to over 250 million barrels. This drop in Russian production in 1945 (148,539,600 barrels) would seem to indicate that at no time during the war period did Russian production increase, but on the contrary declined continuously. These figures, it must be noted, do not include the production of the Pechora Basin, which in 1945 is said to have produced 719,000 barrels.

"The accompanying table reflects the effect of World War II on Russian petroleum production," Perejda said.

"Baku, the largest producing region, dropped 9 percent in 1945 compared with 1940—from 70 percent to 61 percent of the total Russian production. The Maikop-Grozny region, which was occupied by the Germans, dropped drastically in production from 16 percent of the total USSR production in 1940 to 7 percent in 1945 with the complete retreat

of the German armies. During the period of occupation no production was obtained by either the Russians or the Germans because of the destruction of the fields. In this period of occupation, one can safely say that the USSR lost over 16 percent of her production yearly, or roughly 5 to 6 million metric tons (36 million to 43 million barrels) of oil during the year of occupation by the Germans.

Drop in Caucasus Area

"When we stop to consider this percentage we see that it amounts to more petroleum than the production from all the Non-Caucasus regions combined, which produced only 14 percent of the total USSR production in 1940 (4,293,-500 metric tons or about 31 million barrels). The whole Caucasus area dropped in production from 86 percent (26,900,-000 tons or about 195,500,000 barrels) in 1940 to 70 percent (14,250,000 metric tons or about 103,500,000 barrels) in 1945 (a drop of 16 percent) despite the slight production in 1945 of 1,400,000 metric tons (about 10 million barrels) from the Maikop-Grozny region which was put into operation with the retreat of the Germans," Perejda said.

"Keeping in mind the fact that the USSR produced only 31,193,500 metric tons (226,464,810 barrels) of oil in 1940 we find that the proposed production goal of 54[1] million metric tons (about 390 million barrels), set for 1942 under the Third Five-Year Plan, seems enormous. This goal was never achieved probably partly because of the disruption of war.

"Based on the outcome of the 1940 production and taking into account the disappointing effect of the war which curtailed drilling and prospecting, and the fact that the Baku area dropped almost to half of its 1940 production in 1945, the goal was resent for 35.4 million metric tons (about 257 million barrels) for 1950, because it was assumed it would take a few years to restore production to normalcy.

Stalin Sets Goal

"In his February, 1946, address to the nation, Marshal Stalin reiterated the fact that although the USSR produced only 31,193,500 metric tons of oil in 1940, it was still 3½ times the production of 1913, and in this address he set a goal of 60 million metric tons (about 436 million barrels) of oil to be produced by 1960, which goal, he said, would take three or more Five-Year Plans to accomplish.

"These production goals set for 1950 and 1960 do not seem very large when one compares these production figures with the present United States production which exceeds 1½ billion barrels annually. Also it must be noted that geologically the USSR's petroliferous reserve areas are much larger than those of the United States," Perejda pointed out.

In only one of two instances has Russia attained her oil production goal set under the Five-Year Plans.

This fact is pointed out by Soloman M. Schwarz in his article on "How Much Oil Has Russia?" appearing in the July, 1946, issue of *Foreign Affairs*, published quarterly by the Council on Foreign Relations, Inc.

A Striking Reduction

Schwarz cites that the Fourth Five-Year Plan (1946-50) calling for a production of 35,400,000 metric tons of oil not only is much smaller than that for 1942 (48,500,000 tons of oil) set under the third Five-Year Plan, but is even smaller than that envisaged for 1937 by the second Five-Year Plan.

"It is indeed a striking reduction," Schwarz said. "Is it a sign of the approaching exhaustion of the Russian oil deposits?"

Schwarz also questions the high estimates made on Russian oil production during the war, pointing out that the figure set for 1950 under the fourth Five-Year Plan plainly suggests how low 1945 production was.

An important feature of the fourth Five-Year Plan is the effort to change the geography of oil production, Schwarz said.

"The plan, as it was presented in *Izvestia*, March 21, 1946, contains not only figures for the USSR as a whole but also for its individual republics," he said. "Since the northern Caucasus areas form part of the Russian Republic (RSFSR) and no separate figures regarding these areas have been published, it is not possible to estimate the share of the Caucasian oil fields in the total oil production of the Soviet Union.

"Information in the Soviet press shows, however, that the plan proposes full recovery of the north Caucasian oil industry, and perhaps an increase in its output above its prewar level. For the Baku area (in the Azerbaijan republic), however, the goal set for 1950 is only 17 million tons of oil (about 123 million barrels), although this area in 1938 produced 24 million tons of oil and natural gas (about 175 million barrels).

"The share of the fields of Azerbaijan in the total oil production of the Soviet Union is to be reduced from 74.4 percent (as of 1938) to 47.9 percent (in 1950). Consequently, the share of the Russian oil fields, including north Caucasus, has to rise 40.9 percent, that of the fields of Turkmenistan republic to 3.1 percent, and of the Uzbekian republic to 3 percent.

Reshaping Industry Sought

"The general tendency to expand Soviet oil industry in new areas nearer to the centers of oil consumption can be observed also in the plan for drilling. New producing wells which are to be prepared from 1946 to 1950 are scheduled in terms of 'points.' A total of 11,-370 'points' are listed for the 7 oil producing republics mentioned in the plan: 5805 in the Russian republic; 2240 in 3 republics of Middle Asia—Uzbekian, Turkmenian and Kazakh; 2660 in Azerbaijan; 340 in Georgia; and 325 in the Ukraine. (The plan contains no figures on two of the oil producing republics of Middle Asia.)

"That the geography of the Soviet oil industry will be reshaped as fully as proposed in the coming five years is doubtful, but the figures do indicate the trend."

[1] Until recently, U. S. S. R. figures on oil production usually included those for natural gas production also, calculated in units of oil on the basis of 1000 cubic meters of natural gas equivalent to one ton of oil. The Third Five-Year Plan (1938-1942) called for 48,500,-000 tons of oil and 5,500,000 tons of natural gas, a total of 54 million tons.—Editor.

Excess Profits Tax Likely, Venezuela Official Declares

No matter which of the three parties wins the national election on October 27, an excess profits tax likely will be imposed on corporations operation in Venezuela, it was indicated in New York by Dr. Juan Perez-Alfonzo, Minister of Economic Development. The three leading parties all have agreed in principle that an excess profits tax should be levied and, of course, American oil companies active there would be subject to it.

Perez was reminded that the Venezuelan government had given a pledge not to impose an extraordinary income tax this year as was done later in 1945 and he said the government would stand by this commitment but indicated that an excess profits tax would serve the same purpose, supplementing the government's income as the special tax did last year.

The Venezuelan official said so far as he knew, tentative rates for the tax had not been discussed. However, it likely will be assessed against 1946 incomes, Perez said.

Only a few days will be required after the election before the successful party replaces the present revolutionary junta which has been in power for several months.

Perez, accompanied by Alejando Oropeza-Castillo, president of the Venezuelan Development Corporation, is head of an economic mission designed to facilitate purchases of U. S. goods for export to Venezuela.

Peru Production

The Department of Commerce has announced that for the first quarter 1946 Peru produced 4,182,724 barrels of oil. April production (THE OIL WEEKLY, September 16) was 1,006,388 barrels.

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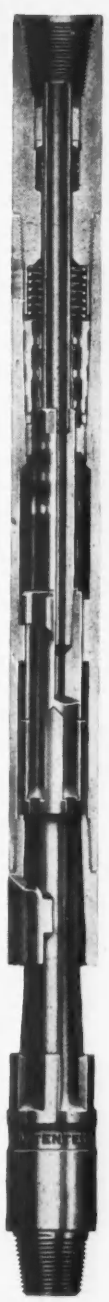

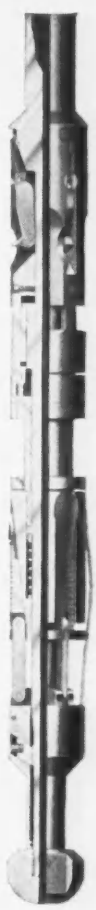

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Sinu Field Deep Test Is Spudded

Dugout canoe with outboard motor is used by employes of Socony-Vacuum Oil Company of Colombia in traveling to operations in the Sinu field.

Sinu Oil Company's Floresanto 1, deep test in the Sinu field, Colombia.

By GEORGE O. IVES, Staff Writer

SOCONY Vacuum Oil Company of Colombia, operators of the Sinu field of northwestern Colombia which it owns jointly with Tropical Oil Company, has spudded Floresanto 10, but has drilled only 484 feet toward the scheduled 10,000 to 12,000 feet to which it plans to go for a thorough test of the deep oil possibilities of the area. Meanwhile, light rigs will continue drilling in an effort to define and evaluate the shallow pay from which there are now two small producers.

Thus far the area has been rather disappointing, inasmuch as there have been only the two producers out of nine wells completed. Floresanto 10 should give a test of all formations, including the Eocene. Wells 1 and 6 are small producers, making about 75 barrels each, and unless more encouraging prospects are forthcoming, the concession is not likely to prove of really commercial value. The two wells in which pay have been found have had only about 25 feet of effective oil sand, found in the middle Miocene. However, the oil is of good quality, testing 40 gravity with no water. Steep dips of structural formations are shown by the difference in depth at which the pay sand is found in the producers. No. 1 produces from sand between 620 and 650 feet, while No. 6 found the same sand between 1150 and 1200 feet. They are only 1300 feet apart.

The Floresanto concession is held under the name of Sinú Oil Company, which is owned jointly by Socony-Vacuum and Tropical Oil Company, and operated wholly by Socony-Vacuum. It was contracted and started its initial exploration term on April 8, 1942, which means that it is now in its fifth year of exploration with a possible three-year extension of exploration time after the second term expires on April 8, 1948. At that time it will enter the commercial or exploitation stage. Fortunately, it is near enough to tidewater to make it of commercial value with less reserve and production than would be necessary if it were farther in the interior. It is situated on the southwestern border of the Department of Bolivar, adjoining the Department of Antioquia, and contains 26,780 hectares (approximately 66,950 acres).

Actual discovery of the first oil on the concession was achieved with the first well, Floresanto 1, which after finding showings in the shallow sand just below 600 feet, drilled to 6936 feet, where casing was set to test a number of showings picked up in other and deeper sands. None were encouraging on tests, and final completion was made in the shallow pay in December, 1945. Meanwhile, three other shallow wells were drilled, deepest of which went only to 2065 feet, and all of the subsequent wells have been shallow holes.

The structure itself is a tightly folded anticline, trending in a northeast and southwest direction with subsurface records indicating a dip of 45 degrees. Although deeper production is hoped for in this area, the company continues to drill shallow wells with a portable rig, the wells serving as core holes from which enough information will ultimately be gathered to delineate the structure against the time when deep production might be found. Discovery of the structure is credited solely to surface geology, and location of the discovery well was determined on the findings of this geology. It was only this year that any geophysical work has been done in the field, and several profiles have been run with reflection seismograph. However, the detail work is being left largely to the shallow wells, which have determined the location of Floresanto 10, the deep test.

Sinú is another area which has to be supplied by water transportation, and here also the dry season makes for delays in operation should it be necessary to move in any considerable quantity of heavy materials. Everything is brought in by water from Cartagena on the Caribbean coast, loaded on barges which are towed from Santagena, all the way down the coast in open water to the mouth of the Sinú River, whence it goes upriver, past the town of Monteria to Socony's Guineo camp on the shore. From that point it must move by road a distance of 21 kilometers back from the river. During the dry season, from the latter part of December until early in April, the river is usually too low to permit passage of tugs and barges, in which case access to the camp may be had by land, but this is for personnel only and not for any heavy equipment. The production camp is still on wildcat status with no families of the staff living on the property. The staff consists of eight or ten Americans, in addition to approximately 200 Colombians.

Although most of the wells drilled have been shallow, that is no indication that drilling is rapid or inexpensive at Sinú. Formations are very solid and abrasive, and the entire hole is drilled with rock bits, with the average performance about 50 feet of hole to the bit. Using the portable rig, operators carry an 8⅝-inch hole. Very little weighing material is needed in the drilling mud, although some artificial weighting substanec is used to carry ten to 12-pound mud. Cementing of casing is performed by the company using a portable, truck-mounted outfit.

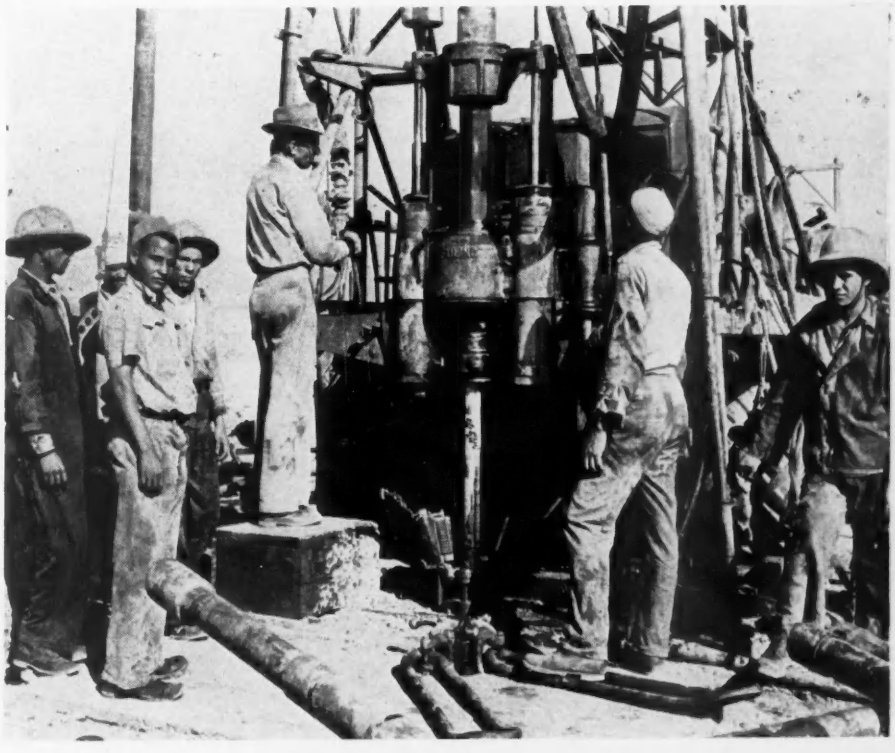
Wildcat Is Located Near the Pyramids

LESS than 10 miles west of Cairo, Egypt, in the shadow of the ancient Pyramids of Giza, oil companies are attempting to find oil in sedimentary deposits laid down by ancient seas.

Standard Oil Company of Egypt, an affiliate of the Standard Oil Company (New Jersey) now is drilling its Abu Roash 1 as a part of an exploration program to test the oil potentialities of almost 6 million acres held on permit from the Egyptian government.

Long regarded by oil men as a possible source of petroleum, the "Cradle of Civilization" is just one of the many remote areas where costly exploration is being carried on to assure an unending oil supply for the world. Geological and geophysical surveys in Egypt were interrupted by wartime military operations in North Africa, but technicians now are pushing their search into hitherto uninvestigated areas of the desert.

Standard's Abu Roash 1 was spudded in January of this year and now is drilling below 5200 feet. Other wildcat tests will be drilled if findings in this first well are encouraging.



View at top of page shows the Abu Roash well, named for the little knoll upon which it is situated, begun in January by an affiliate of Standard Oil Company (New Jersey). The well is four miles from the Pyramids of Giza, shown in the background.

Middle picture shows staff camp houses (living quarters and portable workshops) that dot the rolling expanse of barren desert. The houses are small but comfortably equipped with electricity and modern facilities.

Bottom view pictures Egyptians which man the drilling rigs in the wildcat operation. Here workmen of the core-drilling crew are receiving instructions from an expert American driller.

Increased Price in Mexican Gasoline Big Factor in Rising Cost of Living

The Governmental Decree issued September 17 raising the price of gasoline in the Republic of Mexico an additional 3 centavos per liter—a 13 percent increase which, for comparative purposes, makes the price of 60-octane gasoline equivalent to 20 cents per gallon—is the most immediate result of the increased wages granted to the petroleum workers by Pemex on September 4 in order to avert a general strike of the industry, as reported in THE OIL WEEKLY of September 16, page 80.

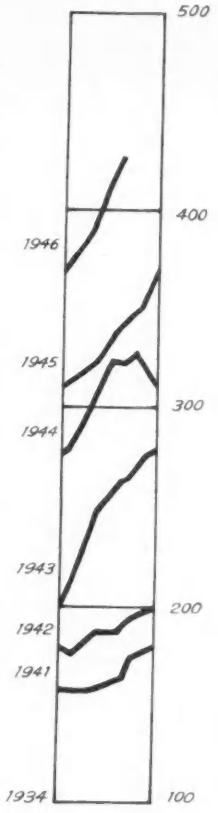
The accumulative effects of this advance in the price of one of the basic necessities in the Mexican economy can hardly be estimated.

A glance at the accompanying chart will show what the inflationary trend has been since 1941—while petroleum products held to the line of practically no price change.

The increase in the price of gasoline, accompanied as it is by a smaller but relatively similar percentage increase in the price of other petroleum products, will undoubtedly influence another spurt in the rise in the cost of living.

Should this 13 percent increase be directly reflected by the same percentage increase in the cost of living index, the 1946 line on the chart will reach the 500 index mark by the end of the year.

The new administration, which takes office December 1 of this year, will have to take some drastic steps to place some control on this runaway inflation. The added impetus sure to be given to the inflationary trend by the price increase in gasoline complicates the problem that much more.



Sinclair Gets Concession For Exploration in Panama

Sinclair Panama Oil Corporation has been granted a concession to explore for and produce oil on a 7,250,000-hectare (about 18 million acres) area in Panama, H. F. Sinclair, president of Sinclair Oil Corporation has announced. The company, owned by Venezuelan Petroleum Company and Cities Service Company, will pay the Panamanian republic $25,000 a year during the exploration period and a royalty of 16⅔ percent on gross production of crude oil and the same on gas.

The concession is for 20 years with the privilege of extension for a similar period. Exploration must start within 90 days from date of contract and the company after three years of such work may select areas which it desires to retain. Drilling must start within six months after the three-year exploratory period.

Included in the concession are refining manufacturing and transportation rights, the republic to receive 25 percent of net profits therefrom.

Mexican Oil Exports Up, Show Wider Distribution

Mexico's petroleum exports continue to show a sharp increase during the current year. The accompanying table, giving a comparison between the years 1944, 1945 and the first 7 months of 1946, reflects the widening arc of distribution of petroleum exported by Mexico.

During the first 7 months of 1946, Mexico has exported petroleum to 9 nations as compared with 5 in 1945 and only 4 in 1944. A majority of this exported petroleum still goes to the United States as it did in previous years. Mexican oil now is going to Africa and Europe in increasing quantities.

The table also shows the reentrance of Panuco crude in the world market. This heavy, 12-gravity, crude produces premium asphalt. The increased shipments of asphalt, together with the movement of Panuco crude, reflects the need of building new and reconstructing old highways throughout the world. Mexico expects to see this demand for asphalt to continue for some time. During the first 7 months of 1946, approximately 316,000 barrels of asphalt crude was exported by Mexico, compared with only 26,000 barrels in 1945 and 59,000 barrels in 1944.

Fuel oil comprised more than one-third of the total Mexican oil exports during the 7-months period of 1946 and almost one-half of total exports in 1945 and 1944. While light crude oil exports have shown a decline during 1946 as compared with the two previous years, heavy crude oil shipments are shown for the first time since 1943. The table indicates that no refined products are being exported by Mexico.

Petroleum Exports from Mexico
(THOUSANDS OF BARRELS)

Country of Destination	Heavy Crude	Light Crude	Fuel Oil	Gasoil	Gasoline	Asphalt	Total Crude and Products
Year 1944:							
Brazil	....	....	....	....	....	59	59
Cuba	....	....	1,449	3	....	....	1,452
Sweden	....	....	328	432	....	....	760
United States	....	598	300	1,522	....	....	2,420
Total All Countries	....	598	2,077	1,957	....	59	4,691
Year 1945:							
Cuba	....	....	3,404	....	1	....	3,405
Guatemala	....	....	44	....	....	....	44
Sweden	....	....	44	110	....	10	164
Switzerland	....	....	59	....	....	16	75
United States	....	2,432	132	1,659	....	....	4,223
Total All Countries	....	2,432	3,683	1,769	1	26	7,911
1946, Jan.-July, Incl.:							
Africa	....	....	126	....	....	....	126
Belgium	84	....	....	....	....	....	84
China	63	....	61	....	....	....	124
Cuba	....	....	1,120	....	....	....	1,120
France	150	....	65	65	....	137	417
Panama	....	....	....	132	....	....	132
Sweden	76	....	....	....	....	2	78
Switzerland	....	....	64	....	....	52	116
United States	956	846	1,201	830	....	125	3,958
Total All Countries	1,329	846	2,637	1,027	....	316	6,155

The OIL WEEKLY
Monthly International Section

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Western Venezuela

By George O. Ives

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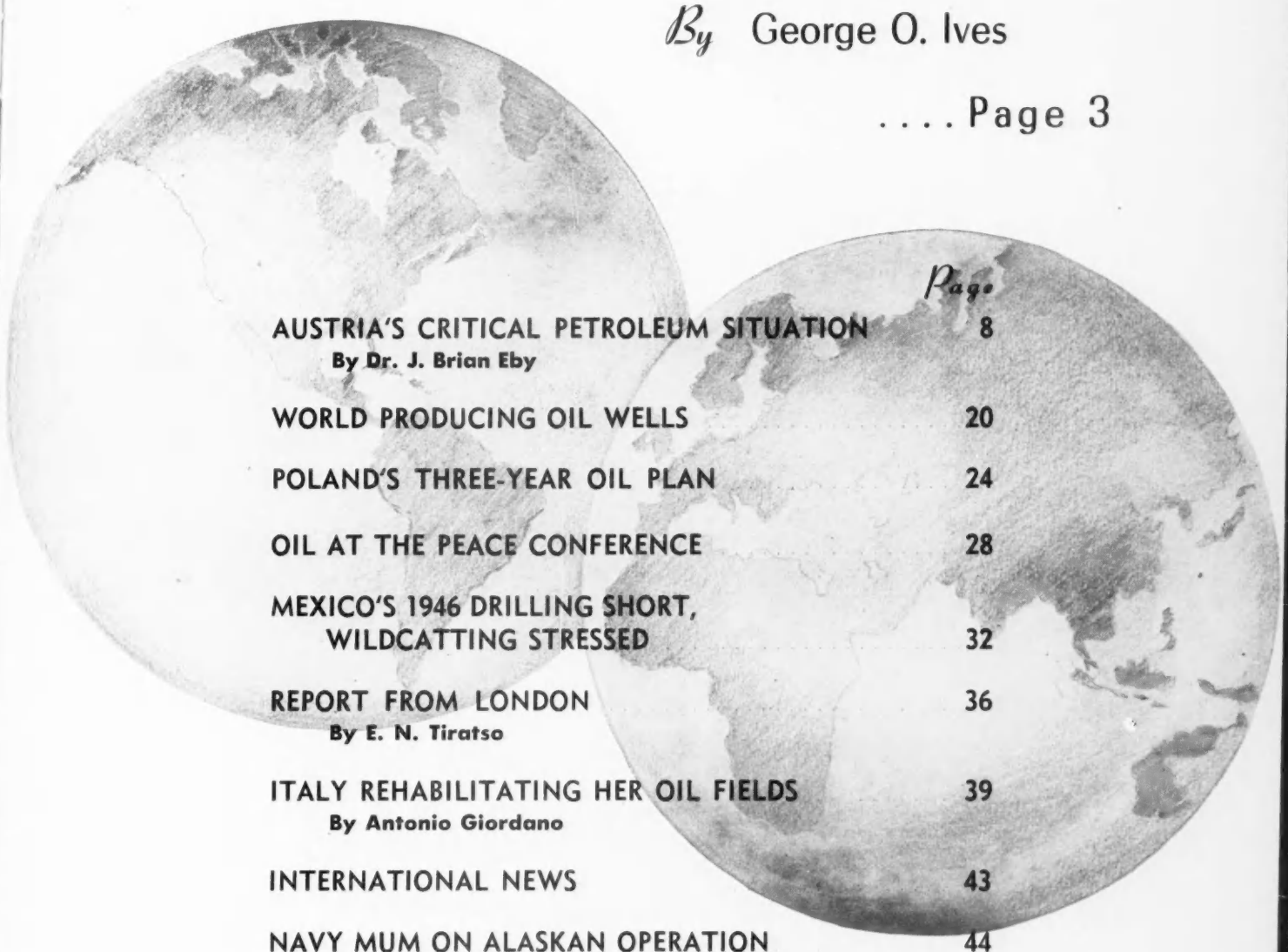

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Expanded Programs Under Way

Western Venezuela

Above is shown one of two 112-foot boats recently acquired by Creole Petroleum Company from the Canadian Navy. Plans call for its use to transport personnel to and from far-flung wildcat operation in Lake Maracaibo, where the boat is shown docked.

Lake Maracaibo production is backbone of Venezuela's output, but much attention is being given development in other sections; La Paz and Mara Cretaceous tests watched

By GEORGE O. IVES
Staff Writer

COULD world markets support substantial increases in Venezuela crude production in light of anticipated quantities of "cheap" crude from the Middle East?

Oil economists have been debating this question and only time can answer the question.

Naturally the Lake area of western Venezuela, as the source of the greater part of crude from this country, has come in for its share of consideration in this speculation. In the considered opinion of the majority of men responsible for the oil program in Venezuela, it will continue to compete under present conditions, the principal uncertainty being the question of labor.

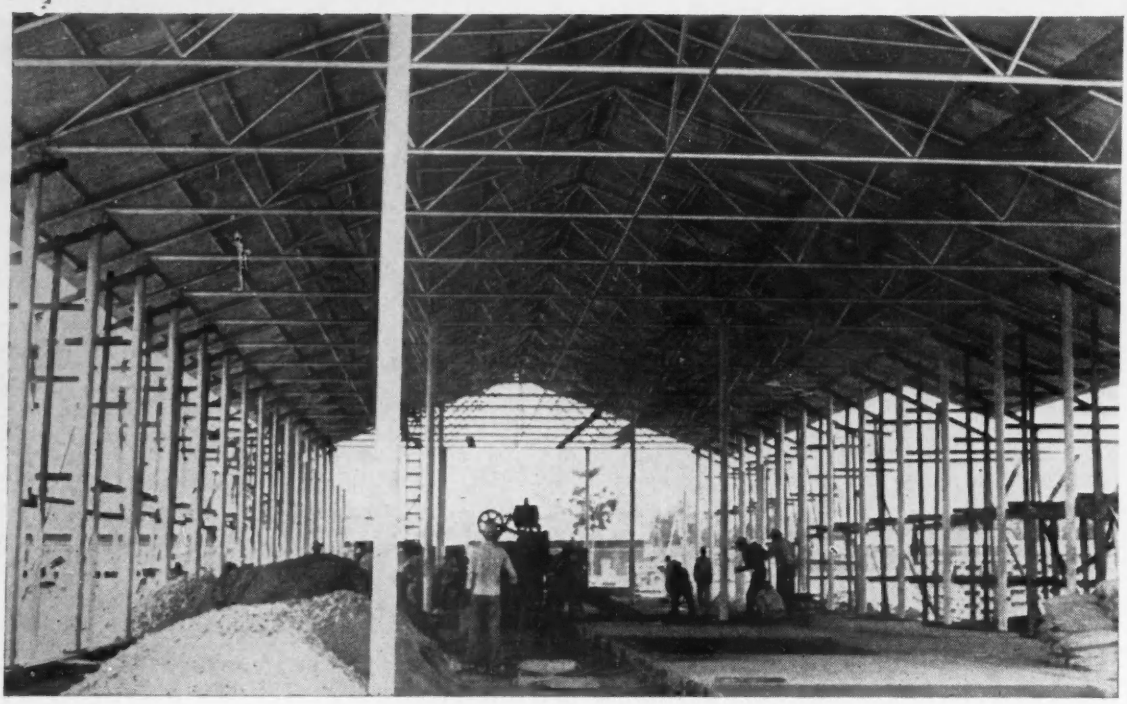
In any event, none of the elements of uncertainty have retarded progress of the expanded programs designed to result in increased production. Evidence of such expansion program is seen in all phases of company activities. Personnel is being increased. Drilling equipment is being added, to a point past that of simple replacement of worn-out machinery. New transportation facilities have been completed with more in actual process of construction. Refinery plans of last year have been revised to give even greater capacity to new plants. Camp housing, shop, and warehousing facilities are being expanded. Whatever the uncertainty regarding the future of Venezuelan oil may be, plans for the future apparently have not been affected.

Lake Region Active

A quiet atmosphere of purposeful activity seems to prevail throughout Western Venezuela. A year ago, at the time of the cessation of hostilities in the Far East, the Maracaibo Lake Basin was one of the greatest oil producing localities of similar area in the world. In this respect it has continued and, in addition, not only has enhanced its position as regards the older fields, but important discoveries west of the lake have opened up huge new areas for exploration.

A year ago an observer felt that operations in this area were those of settled production on a large scale, even though a steady program of step-out drilling by Creole Petroleum Company in the lake itself, had resulted in steady addition of more producing area, principally at Tia Juana and Lagunillas. There was a definite air of urgency in getting the oil produced and transported to feed the war machine, and most of the drilling was concentrated on proved acreage. Their productive ability is attested by the three-quarters of a million barrels of petroleum produced daily from the Lake Basin. Heavy demands have continued so that the area is regularly producing, and has produced throughout the year to date, at rates equal to or in excess of peak wartime output.

The new feeling of activity is that always apparent in an area where fields have been found of proved potential productivity and where



New warehouses and shops in La Paz industrial area are of welded tubular steel construction.

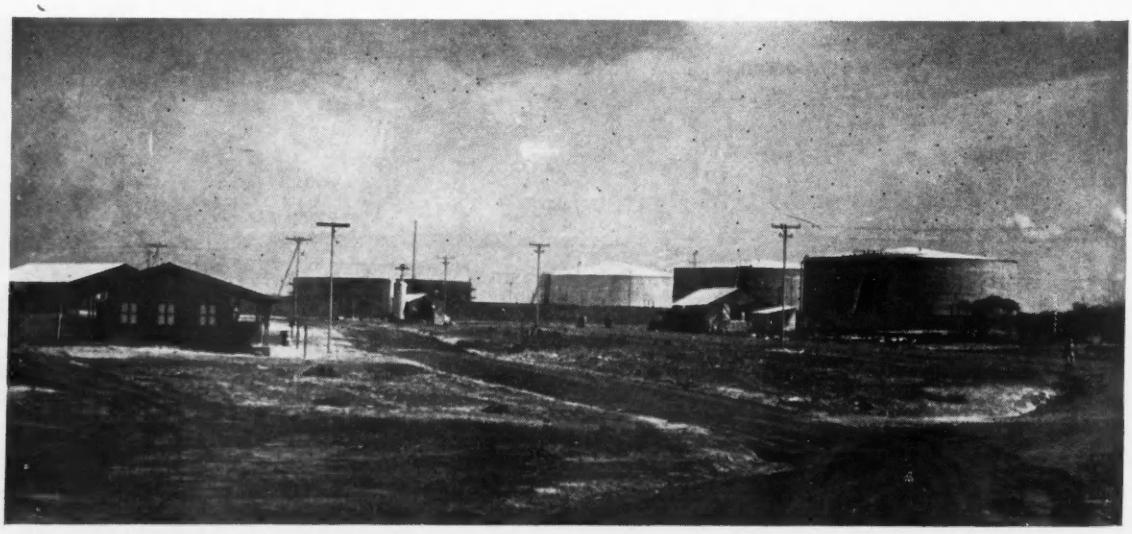
wide expanses yet remain to be tested. Too, drilling in proved areas has been accelerated. One of the companies, Mene Grande Oil Company, a producer for more than two decades in the lake, was running only one rig a year ago. This company now has seven rigs active in the area and has two more rigs being delivered, these to be used for wlidcats on locations already selected. Creole has added one rig within the year and is running eight strings in the area, four of which are wildcats.

The Shell group is operating 20 rigs out of Maracaibo distributed in eastern shore fields and west of the lake from Las Manueles opposite the south end of the lake to Mara, northwest of the lake. One, a wildcat almost certain to open a new field in the Cretaceous limestone, is considered most important. Another of the Shell group's wildcats, east of Lake Maracaibo in the Curazao area, has already set a record as the deepest well south of the United States, and late in August was still drilling below 14,400 feet. Others are on exploratory work in the new La Paz and Mara Cretaceous production, while yet another is starting below surface casing on a Cretaceous test, the first deep test at La Concepcion field.

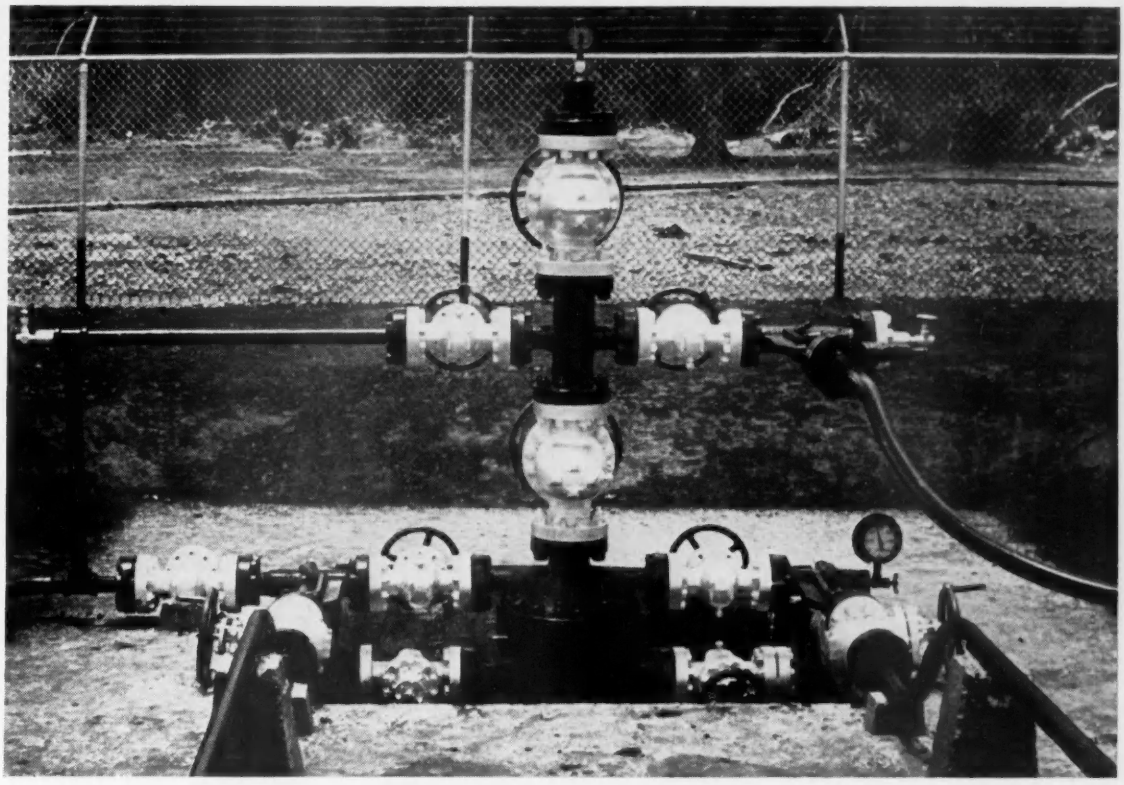
Other Operations

Richmond Exploration Company is operating four wildcat rigs west of Lake Maracaibo and south of the new Shell strikes. Guasare Exploration Company is operating a rig in the Amana area, northwest of Mara field, where the first well has been completed from shallow formations as a dual zone producer and where a deep Cretaceous test is planned which will require an additional rig. In all there are now 40 rigs running in the western part of Venezuela with several more rigs not yet in operation or on order. At least four operators not yet active on the west side, hold concessions near the important new production and early drilling can be expected.

Disregarding the new production—in itself an irresistible incentive to a widespread and active exploration program—a vigorous wildcatting campaign was certain. A great backlog of exploratory concessions had accumulated during the war when materials and manpower shortages prevented adequate tests. Now dates are rapidly approaching when operators will have to decide which acreage they will keep. At this time, approximately half of the acreage can be retained with the rest thrown back into government reserve and subject to competitive bidding by any qualified operator. Notwithstanding the fact that geophysical work is going forward rapidly, the companies feel that more complete subsurface information needed for selection can be obtained by drilling



Terminal storage at Palmarejo. Crude is loaded through submarine lines to vessels anchored offshore.



Typical Christmas tree set-up on one of new Cretaceous wells in La Paz field. Production is through two flow lines on casing and one on tubing.

deep wildcats, and this they intend to do, following the seismograph work as closely as is practical.

Richmond Exploration Company is faced with one of the most strenuous programs. It has until the end of 1947 before making selections, and in addition to the four heavy rigs already operating in Area 1—their designation for the acreage in the state of Zulia west of the lake—is preparing to move in another heavy rig from the Montenita area where it drilled a deep dry hole early this year. Even with these five heavy rigs running continuously their outlook for a thorough test of the region is none too bright, because they hold a solid block of 1,717,735 acres in exploration concessions, much of which is located in territory difficult of access and operation. Some is swampy, some is hilly and jungle covered, and 365,000 acres of it is in the lake itself. Loffland Brothers Drilling Company has contract for two of these wells while the remainder are company operated. Drilling conditions are such that no great speed can be maintained. The first well, Zulia 1-1, spudded more than a year ago, has not yet been completed. Near the town of Concepcion close to the shore of the lake, it is the most accessible of any of the presently drilling tests. Drilled to a depth of 9835 feet, 5½-inch casing was set at 9830 feet, and a series of tests are still in progress to determine the importance of showings picked up through coring and electric logging. Several shows have been tested but none of commercial importance.

Expensive Operations

The other wells are spaced at intervals 15 to 25 miles westward toward the Colombian border from Zulia 1-1 and are drilling from 2500 feet to 9000 feet. A very small amount of the surface hole may be drilled with drag bits, but for the most part it is rock bit drilling with an intermediate string of 8⅝-inch casing at a point below 8000 feet. This expensive exploration program is being carried on with no backlog of production such as is held by some others in the area, and is in addition to work on a block of more than a million acres in the Delta Amacuro section in extreme eastern Venezuela. To support the Western Venezuela work alone, Richmond has increase its payroll within the past year from 300 to 800 persons and this does not include two Petty Geophysical Engineering Company seismograph parties working under contract.

Since early in 1945, when the Shell group found the first Cretaceous production in a deep well at the shallow La Paz field, the Cretaceous has been the subject of much speculation, with the discoverers seemingly reserving an evaluation pending longer record of performance. On the strength of initial show some of the optimism seems justifiable. Wells appear to have no difficulty in sustaining a flow of 7500 to more than 10,000 barrels daily, and in the two areas where it has been found productive—La Paz and Mara—the section has ranged in thickness from 1000 to more than 2000 feet, and wells were drilled right on through this limestone into the basement granite at top of the structure without finding a water table. On the other hand it is prolific only where it is fractured, and in the one or two wells where the lime was not fractured the production has not been so large. However, only eight wells have been completed in one locality and three in the other, one of which is being deepened, not having gone very far into the lime. Wells at Mara are approximately 7000 feet deep and at La Paz around 6000 feet. Step-out wells 1½ miles from production are being drilled on northeast and southwest ends of La Paz now. Neither area is defined.

Importance of West Tarra

Wildcats to a depth sufficient to test the limestone where it is productive have been scarce in the area, but those drilled indicate that the formation in the producing areas is not necessarily continuous throughout even on strike. The most important development since La Paz deep pay was discovery of potential production from the limestone in Shell's West Tarra wildcat, far to the south. The area where it is to be found at a reasonable depth may be somewhat restricted in width, but the new wildcat development would indicate plenty of territory between there and Mara favorable for prospecting if structures are found. Richmond's present series of wildcats may not shed much more light on limestone possibilities, since it is believed that the projected 10,000-foot tests would not be likely to reach it, in the most westerly portion of the block. The formation underlies the Eocene in the areas where it is productive, but there is little likelihood that the big fields on

This temporary battery of steam reciprocating pumps is handling 45,000 barrels daily from new Cretaceous wells in La Paz field.

the eastern shore will be drilled in search of it, since Shell's deep test at Curazao, east of Cabimas and well updip from production, has not yet gone out of Eocene at 14,000 feet.

Creole's ambitious wildcatting program will serve as an aid to evaluating its huge lake block, which extends over much of the northern portion of that body of water. It is drilling three wildcats for its own account and another in the center of the lake for the account of Shell, which owns an extensive block there. One of these wildcats is 27 miles offshore and within a few miles of the western shore. Such operations—in 90-foot water—are very expensive. One of the big problems is transport. By provisions of the new labor contract, workmen must be paid for time going to and from the job and a round trip from the La Salina docks to the new wildcats consumes from 3½ to 4 hours, so that the crew must be paid for a day and a half for eight hours work.

Tabulation of Acreage

Latest tabulation of acreage held under various types of contracts is of January 1, 1946, and activity has continued to date, but the year-end figures will indicate the attitude of companies toward exploration. At the first of the year, 8,350,000 acres were held under exploration concession contract in all of Western Venezuela, and the major portion of it—considerably more than 5 million acres—is located in the states of Apure, Barinas and Tachira. This would point to considerable exploratory work in Western Venezuela outside of the Maracaibo Lake Basin area itself, where some 3¼ million acres await exploration and selection. The Barinas section actually is considered separate from other areas in the west, being entirely separated by topographic and geologic boundaries and has to be entered either by air or by way of the Orinoco River from the Gulf of Paria, northeast coast of South America.

Four companies hold the major portion of exploration acreage in the lake basin itself: Richmond Exploration Company, Mene Grande Oil Company, Creole Petroleum Company, and the Shell group. Mene Grande's acreage is distributed through the area, much of it being in blocks south of production on the eastern shore, and due for drilling before 1947. All hold some acreage in the vicinity of Mara Cretaceous limestone production. Creole and Richmond hold most of the Lake Maracaibo water acreage, and while Creole is actively prospecting in the lake, it is unlikely that Richmond will have an opportunity to do much along that line before selection time, in which case it will probably select a checkerboard pattern and prospect later.

A new supply problem is posed for Creole if the 246,000-acre block in the northwest part of the lake becomes productive. With production there, and the need for intensive development, it will probably be necessary to establish a new base on the west side of the lake with sufficient warehousing and shop facilities to carry it out as a separate operation from eastern lake fields. Such a base would entail unusual construction and maintenance problems since the terrain opposite the exploration block is extremely low and swampy. Actual drilling in the lake has become routine for Creole. In lake drilling the engines and draw works are carried on the derrick floor, with barges carrying mud tanks, boilers, pipe racks, coring and swabbing reels, anchor winches, etc.

Some of the most active operators have laid out five-year programs, with definite commitments on locations to be drilled, and are working to expand facilities for handling and transporting crude. From the appearance of some of these programs it is not hard to visualize sharp increases in production rates from year to year in the foreseeable future.

Venezuela Maintains High Producing Rates

Creole Petroleum Corporation, operating in Venezuela, has reported a daily average crude production for the month of September of 581,539 barrels. This maintains the high producing rates of the past several months and even approximates its peak daily average for a single week, its all-time high being during the week ending September 9 when it sustained an average of 586,701 barrels daily. For the week ending September 9 the entire output of Venezuela had also reached a peak of 1,118,769 barrels daily.

September's production for Creole represented an average of 427,531 barrels daily from Western Venezuela fields and 154,008 barrels daily from Eastern Venezuela. Evidence of operational activity during September was seen in the company's completion of 21 wells during the month, 15 of which were oil wells in proven areas of Western and Eastern Venezuela, and 6 were dry wildcat operations. The list of completions included one of the first wells completed in some time in El Roble field near San Joaquin, a 10,087-foot well producing 894 barrels daily.

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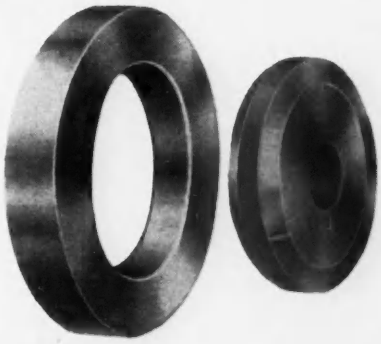

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A BUSINESS BUILT ON *Good* SERVICE

A First-Hand Study—

Austria's CRITICAL PETROLEUM SITUATION

By
DR. J. BRIAN EBY
Consulting
Geologist,
Houston

THE petroleum situation in Austria is deteriorating so rapidly as a result of a long series of fantastic frustrations in trying to deal with the Russians concerning British and American oil properties that a crisis is rapidly approaching. If the light of day can help crystallize a strong enough public opinion, Anglo-American oil investments in Austria exceeding $100 million may yet be saved and with it the economic and political freedom of Austria itself. To present the facts as accurately as possible the writer, as editorial representative of THE OIL WEEKLY, came to Vienna for a first-hand study. While it is intended to stick to facts, if opinions or conclusions are given they should be interpreted as those of the writer and not necessarily those of either the U. S. government or the oil companies. The reader, however, may draw his own conclusions.

In order more clearly to follow the course of events two chronological tables are given, Table I, "A Historical Summary of Oil in Austria," and Table II, "Recent Political History of Austria." A third table of annual production from 1930 to 1945 and monthly production for January through July, 1946, likewise is given.

The oil fields of Austria lie in the Vienna Basin extending from Central Moravia in Czechoslovakia to south of the Danube and east of Vienna. These oilfields lie in Lower Austria and are entirely in the Soviet Zone of occupation. Current production of crude oil is 70,000 tons (474,320 barrels) per month or about 840,000 tons (5,691,840 barrels) annually. In the days before the Anschluss, Hitler's seizure of Austria in 1938, these fields approximated 33,000 tons (223,608 barrels annually. During the German occupation and war years, production reached an all-time high of 1,212,875 tons (8,218,440 barrels) in 1944, but largely by non-economic flush production methods. Not only do all the oilfields lie in the Russian Zone but all of the important refineries. Since oil is the dominant factor in Austrian economy, control of oil is likewise control of Austrian economy.

Prior to the Anschluss, the Austrian government granted exploration rights to individual applicants in the form of freischürfe. Each freischürfe is a circular area with a radius of 425 meters (1394 feet). If oil was found, grubenfelder (leases) were then granted, each grubenfeld being a rectangular area of 360,000 square meters (89 acres). Prior to the Anschluss the capital in all private enterprises, interested in Austrian oilfields in the Zistersdorf area of the Vienna Basin, comprised American, British, Swiss and Austrian. There was no German capital in the Austrian crude oil producing ventures prior to Anschluss. The Rohölgewinnungs-Aktengesellschaft (known as RAG) is an Austrian producing company, owned 50 percent by Socony-Vacuum Oil Company, Inc., and 50 percent by Royal Dutch-Shell. This company was one of the leading pioneers in the Zistersdorf area, having began its operations in 1935 and at the time of the Anschluss held freischürfe to the extent of some 700,000 acres. By virtue of the Bitumen Law, enacted by the German government, which became effective in July, 1940, all freischürfe rights reverted to the state without compensation to the owners of the title rights. These freischürfe were then allotted to German companies as oil concessions. The grubenfelder, held at that time by the producing companies, remained their property RAG and the other companies protested without

AMERICAN and British oil interests in Austria exceeding a hundred million dollars in valuation are face to face with bankruptcy and total loss. Their oil fields and refineries and a large portion of the distributing facilities are in the Soviet zone and under Soviet dominance. American and English personnel, from owners and executives to technical experts, are denied free access to their own properties. The Anglo-American interests are facing bankruptcy in capital, in working equipment, and in actual oil reserves. Soviet prohibitory tactics, frustrating delays, and studied misunderstandings, lead to the inevitable conclusion that it is a predetermined plan to oust all Western ownership from the Soviet zone of Austria.

In studying this problem for The OIL WEEKLY, I was received by General Ralph Tate, acting commander of United States Forces in Austria, by Lt. Col. James R. Rundell, head of Economics Division, by Lt. Col. Arthur S. Briggs, head of Fuels and Mining Branch and by A. F. Sentous, head of the oil section. Officials of the Austrian government received me as did several oil company executives and to them I am indebted.

Any thought that the present Austrian government is a puppet or Quisling government is quite incorrect. Dr. Renner and his cabinet are doing a valiant job and have earned the vigorous support of General Mark Clark and his British and French allies.

Most of the oil resources of Europe are today under complete or part control of the Soviet government and the solution of the Austrian problem may well set the pace for the entire economy of Europe. The support of a strong American and British public opinion to maintain a free and independent Austria is the foundation on which a real solution of the problem may be realized.

—The Author.

Tank cars in the marshalling yards at Wels, Austria, wrecked by the 15th Air Force bombers. (U. S. Army A.A.F. Photo)

success against this expropriation. This status remained until the occupation of Austria by the Soviet military forces. Under Russian interpretation of the Potsdam agreement, all German assets within their area of occupation became Soviet property and since the time of their occupation they have physically seized and have assumed complete and direct control of all such properties.

Claimed as War Booty

American and British private interests, supported by their respective governments, have filed formal claims for the restitution of the properties forcefully taken from them by the Germans and now operated by the Russians. To date the Russians have made no admission that they consider any of these disputed properties to be other than German assets and as such their legitimate war booty. In fact, should they make such an admission, which the American and British governments claim they must do in accordance with the London and Moscow Declarations, they are for all practical purposes entirely out of the oil business in Austria because, as stated above, pre-Anschluss there was no German capital in the Austrian oil producing fields. Of the present Austrian production of approximately 70,000 tons (474,320 barrels) per month, roughly 45,000 tons (304,920 barrels) represent Russian seizures and the remaining 25,000 tons (169,400 barrels) are produced by American and British capital from areas which were not affected by virtue of the Bitumen Law.

Along with the producing fields, the Russians also seized all refineries, except three which belong to American and British interests. Those operations, both producing and refining, which were tacitly admitted by the Russians to be American and British (although no formal acknowledgment has ever been received to this effect in spite of repeated requests of both the American and British governments) were, however, immediately put under strict Russian control and that control still exists with no sign whatever of its being removed. In each of the American and British fields there exist Russian control officers who are the virtual dictators of the operations in these fields.

Efficient Rates Exceeded

Every effort has been made by the Russians to force maximum production regardless of scientific development or regardless of the fact that many of the wells are producing beyond their economic potential. The main thought has been greatest possible production today with no thought whatever for tomorrow and they appear to have no interest whatever in conserving reserves. Equipment worth many millions of schillings was removed from the American and British fields by the Russians and all efforts to date to obtain payment have been futile.

The Soviets, claiming most of the oil properties under their terms of interpretation of the Potsdam Agreement, as being concerned with ownership of German External Assets, have complete possession of the fields and refineries. Back in August, 1945, Soviet representatives made strenuous efforts to arrive

TABLE 1

Historical Summary of Oil in Austria

1891—The gas field of Wels was discovered and exploited with more than 100 wells and handshafts.

1903-1904—A deep well near Wels was unproductive and did not encounter the expected oil-pool.

1906—The small occurrence of tractoil near Leoprechting in Upper Austria was discovered and in the Schlier near the border of the basement a heavy asphalt-base petroleum was found.

1914—The first geological work in the Vienna basin was started by v. Boeckh.

1918—Dr. Hermann Vetters continues this geological work.

1925—Dr. Friedl was engaged by Vacuum Oil to work in the district of Zistersdorf which according to the geologicol data was already said to be prospective oil land.

1926—Vacuum Oil retired and F. Musil, an Austrian engineer acquired large exploration rights in the Vienna basin.

December, 1928 to June, 1929—The first structural tests were drilled in the district of Zistersdorf by the Steinberg-Naphtha and the Baky-Danubia and thereby the most important tectonic element, the so-caled "Steinbergbruch" was localized by Dr. Friedl and Sommermeier.

August-November, 1929—A well (Stephanie) was drilled in the Steinberg district but abandoned in 322.6 meters (1058 feet) as a dry hole.

1929—The Raky-Danubia was drilling a well (Windisch Baumgarten) 1 which was abandoned for technical reasons in 245.25 meters (804 feet).

March, 1931—Windisch Baumgarten 1A showed the first signs of oil and gas in the Vienna basin.

May, 1931 to November, 1932—The newly established Oil Production Company together with the Raky-Danubia obtained the first production of oil and gas in the Flysch (Gosting 1.)

1934—The oil field of Zistersdorf was discovered by Oil Production Company. Gosting 2 showed oil-production which was very important for industrial reasons.

1936—The Flysch field, very promising at first, later becoming quite local, was discovered by Neusiedl 1 on the Steinberg.

September, 1936—Crude Oil Production Company, a new subsidiary of Shell and Vacuum, discovered a pool with Rag 2 near the Gosting mine.

September, 1937—Van Sickle 1 showed existence of the St. Ulrich Domung north of the productive oil field near Neusiedl on the Zaya. Shortly before the field Gaiselberg had been discovered by the Rag.

1938—St. Ulrich 1 of German Petroleum Ltd. Company discovered a deposit on the St. Ulrich structure.

1939—Van Sickle 2 showed a new success as the Tiefschollen struktur St. Ulrich which had already been discovered by Van Sickle 1.

1941—St. Ulrich 24 showed oil in the Flysch of the Hochscholle of Neusiedl-Prinzersdorf. The fields of Maustrenk were discovered.

1942—The gas fields of Aderklaa near Vienna were opened.

at agreement on behalf of the USSR, with the then Provisional Renner government for the joint development of the major part of the oil resources of Austria by a Soviet-Austrian monopoly under terms which were most favorable to the Soviets. The negotiations, however, were broken off by the Austrians in September, 1945, when it was foreseen that little or no benefits would accrue to Austria.

In October, 1945, the Soviets organized a so-called Soviet Mineral Oil Administration for Austria and commenced operations, assuming supervision and control of the oil industry. This action was without consultation with the Allied Council. It arranged for the exclusive distribution and sale of oil and products, and excluded existing sales and distributing agencies from any participation although these agencies consisted of most all of the important oil distributors and had been designated by the Austrian government as the official distributing organization for all Austria. Dr. Rjabinin, mining engineer, is head of the Soviet Oil Administration, reporting to the Supreme Soviet Commander, Col. General Kurasow. All production—70,000 tons (474,320 barrels) per month—is sold to the Soviet Mineral Oil Administration (SMOA) at the field. The SMOA, in accordance with predetermined programs made solely by them, allot this crude to the refineries, to which it arrives both by tank cars and by an American-British 12-inch pipeline 50 kilometers (about 31 miles) long, owned jointly by Socony-Vacuum and Shell, from the field to Vienna.

Soviet Control Absolute

To indicate the thoroughness with which the Soviets assumed control, independent oil firms were instructed to take orders only from Soviet authority. Also, the Soviets issued regulations and directives regarding the processing and delivery of all oil products. These even involved companies in which there is a substantial American investment. In the fields the Soviets maintain armed partisan guards, who are Communist Austrian youths, at the expense of the companies. The Soviets also maintain at the companies' expense a so-called fire-brigade, despite the fact that the companies' workmen are fully trained to fight fires. Protests to the Soviets against this practice have been completely unavailing.

The tank car situation is an additional example of irritation and friction. The Soviets by delaying permission for tank cars to move, have made it necessary to ask for 100 additional tank cars to add to the fleet of 300 now in use to move products from the refineries to the western zones. All products could be moved with prompt dispatch with much less than 200 cars. Late in September 18 U. S. stenciled tank cars were confiscated by the Soviets between the Vacuum refinery at Vienna and the Lobau refinery, 18 kilometers (11 miles southeast of Vienna, on orders issued by Soviet General Korian at Mödling near Vienna. His orders were to confiscate any rolling stock not Russian marked, regardless of ownership, if found in the Russian Zone. Only by the intervention of highest military channels were the cars restored several days later.

Food Claims by Russians

The Soviets advertised widely that they are supplying the workmen in the fields and in the refineries with extra rations, which is true, but the workmen themselves pay the market prices for the food, while the companies bear the cost of transportation from sources which are unknown.

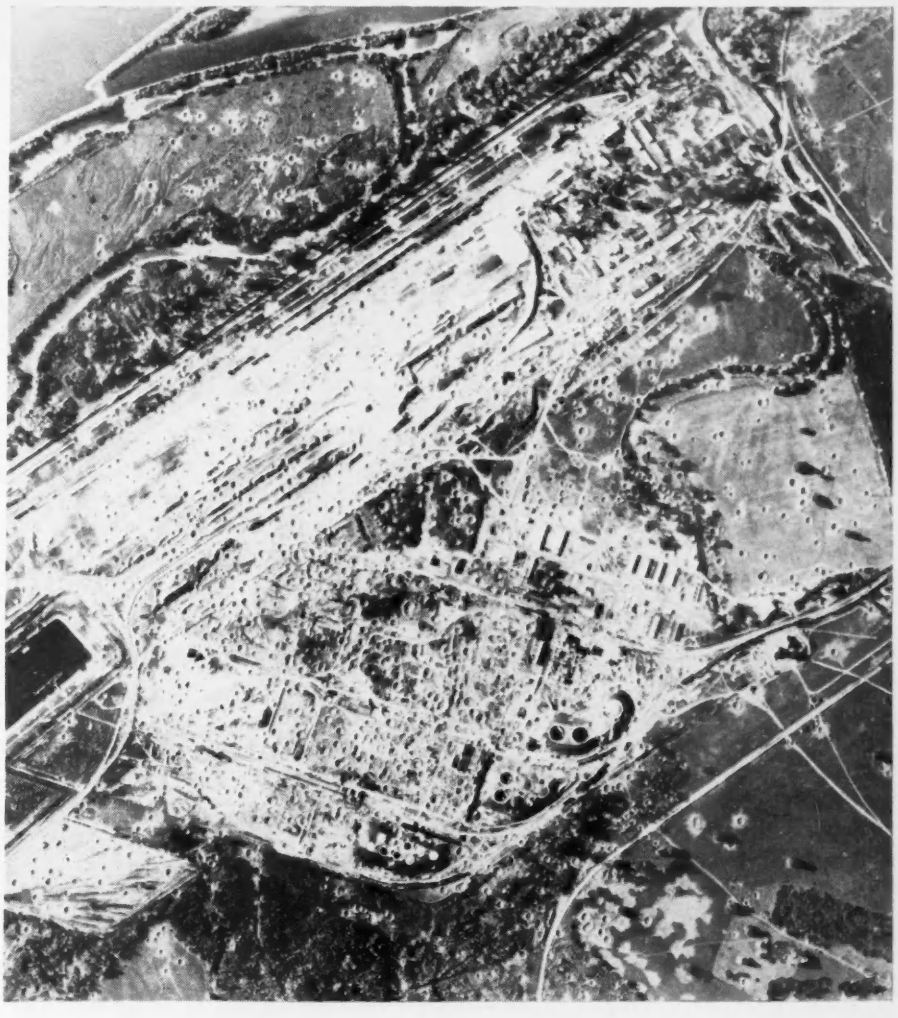
Local Austrian members of the management can visit the fields but American and British resident members of the management do not have that permit and, in fact, have not visited the fields.

In view of the degree of control exercised by the Russians, neither any of the British or American interests have brought in any new equipment whatever since the liberation nor have the Russians imported any drilling equipment for those areas which they have physically seized. It is reported that recently the Soviets have started drilling three or four wells in their seized fields. American and British interests have not attempted to drill any wells since the liberation on their properties due partly to the fact that their stocks of tubing and casing were removed by the Russians and have not as yet been brought back, but principally because of uncertainty of the future. Pending claims for the missing pipe have gained no response from the Soviets. Three heavy rotary drilling rigs also were seized and removed.

Protests Are Futile

In addition to the large quantities of equipment taken by the Soviets from American and British producing fields, the practice still continues of forceful removal of various types of units which

U. S. Army A.A.F. photo showing results when oil refinery at Lobau, Austria was bombed.



are taken to the seized Soviet properties. Protests receive no response.

Owing to the excessive production demanded by the Russians, the water content has already increased to about 50 percent on the average of the gross fluid since the resumption of production after the liberation of Austria. All efforts to counteract this increase of water failed due to the resistance of the SMOA. It is reported that they are now producing in certain cases wells with an excessive oil-gas ratio of 2000/1, which results in considerable damage to the natural pressure of the subsurface oil deposits. The practice before Soviet occupation was to produce a well with an oil-gas ratio not exceeding 500/1.

Refineries Shut Down

In connection with the excessive overproduction of the present fields, two of the refineries, Lobau and Nova-Schwechat, German seized property, are shut down due to excessive water in the crude oil. Lobau refinery was shut down on September 10 for this reason. Dis-emulsifiers formerly supplied by the I. G. Farbenindustrie are no longer available in Austria so that separation is difficult. The crude brought into the two above refineries the past month carries water that will not settle out, presenting a new and complex problem.

Workers and employes of American and British companies are often summoned to attend Russian political meetings at which time the virtues of Russian communism are extolled and oppressive western capitalistic tendencies derided. In other words, every attempt is made to communize all the Austrian employes and workers.

By order of the Allied Council the Austrian government is the supreme authority insofar as prices and wages are concerned. These were frozen to prevent inflation. In Russian-operated industries, however, they have, without reference to the Austrian government, arbitrarily increased wages averaging some 70 percent. American and British companies in this zone to prevent strikes have been forced to follow to the same extent, although they have been unable to recover any of these additional costs by increasing the prices either of crude oil or finished products.

Each of the American and British refineries (there are three—all in Vienna in the Russian Zone) has Russian control officers who are in complete charge, although nominally the companies' own employes are carrying on actual operations. These refineries were badly bombed during the war and are capable now only of primary distillation and simple sulphuric acid treating of lubricating products. Few of the refineries are equipped to make ordinary grades of greases. The gasoline yield from Austrian crude by simple distillation ranges from 5 to 8 percent of a very low octane number. Refinery operations, although under Russian control, are more or less limited to the ability of existing equipment which means low grade motor gasoline, poor kerosine, gas oil, poor lubricating products and heavy fuel oil.

Products Sold by Command

All finished products from all refineries, including American and British plants, are sold by command to the Soviets at the refineries. The Soviets, through their monopoly distributing organization which was the former German Benzol-Verband, are the exclusive distributors throughout the Russian Zone and Vienna. American and British distributing companies had by far the larger share of the distribution in the Russian Zone and Vienna which area comprises some 60-70 percent of the entire Austrian economy, and these companies are now completely excluded from the Russian Zone, and their equipment and installations lie idle. Until May of this year, all petroleum products arriving in the American, British and French zones were brought in by the occupying military forces in each zone and those products released by the military for civilian consumption were distributed by the former prewar distributors which include American and British interests. That portion of the goods released in the United States Zone were supplied by the Army under the disease and unrest formula. May of this year, when UNRRA assumed responsibility of supplies for Austria, it indicated it would furnish no petroleum products so long as Austrian indigenous production was sufficient to meet the entire Austrian demand. Under extreme pressure from the Austrian government and the Allied council, the Soviets reluctantly agreed to supply substantially all of the Austrian requirements except gasoline of which they are supplying approximately 56 percent at this time. Upon receipt of such products from the Soviet controlled Benzol-Verband, actual distribution is given to the recognized distributors.

The history of the Benzol-Verband is

important. The Benzin-Benzol Verband Oil Distributing Company, generally known as the Benzol-Verband was, before 1938, a German company operating in Germany only. It entered the Austrian picture in 1938 at the time of Anschluss through arrangement (Berlin sponsored) with Creditanstalt-Bankverein of Austria, which banking institution controlled both Fanto Oil Distributing Company and the Vösendorf refinery. When Creditanstalt-Bankverein came under control of German interests in 1938, the Fanto and Vösendorf organizations were transferred to the Benzol-Verband.

Soviets Make Claim

The Benzol-Verband is considered by Soviets an external German interest and hence is claimed as Soviet property. During the war, and until recently forced by Soviets to leave the pool, the Benzol-Verband was a member of the Mineral Oil Firms' Pool, the official distributing organization of the Austrian government which still constitutes approximately 80 percent of all storage and distributing facilities of Austria.

Benzol-Verband's quota in the pool was approximately 12 percent. As official distributing agency for the Soviet oil administration, the Benzol-Verband is the only company authorized by the Soviets to sell or distribute indigenous petroleum products in Vienna and Lower Austria although it operates only 20 to 30 of its own pumps in Vienna plus a few more Soviet controlled pumps.

The Austrian government has complained of the inability of Benzol-Verband to make deliveries in Vienna and Lower Austria because of insufficient distribution facilities, and of consumers having to fetch goods in barrels from the refineries at prices calculated to include delivery costs. The Pool continues to operate in the Western Zones, but is, however, prevented from purchasing directly from refineries. All purchases must be made through the Benzol-Verband at prices indicated by the Soviets.

The Soviets have eliminated wholesale consumer and jobber prices, forcing all consumers, large and small, to pay the smallest wholesale dealer or top barrel-lot price. The intervening profits are being pocketed by the Soviets through the Benzol-Verband.

The Soviets actually are supplying to Austria total requirements of kerosine, diesel oil, spindle oil and railroad axle oil. They are short of white oil, quality lube oils, and greases of all types, necessary ingredients therefor not being available in Austria. As pointed out above the Soviets are supplying only 56 percent of necessary gasoline requirements. There is also a shortage of fuel oil. At the same time the Soviets are exporting fuel oil to Germany and elsewhere, and consistently use every possible excuse to keep Austrian deliveries as low as possible.

TABLE 2

Recent Political History of Austria

March 12, 1938—Hitler invades Austria.
Sept. 1, 1939—Hitler invades Poland, war starts.
July, 1940—Germany announces a "Bitumen Law" in Austria, seizing all private oil exploration rights (freischurfen) in Austria.
Nov. 1, 1943—Great Britain and U. S. guarantee liberation of Austria.
April 10, 1944—Plans laid for military government for Austria.
March, 1945—Four-power occupation of Austria decided.
April 13, 1945—Soviet forces enter Vienna.
May, 1945—General Mark Clark appointed U.S. Commissioner on Allied Council.
July 6, 1945—United States forces, Austria (USFA) organized.
Sept. 11, 1945—First meet Allied Council in Vienna.
Oct., 1945—Soviets organize, "Soviet Oil Administration" for Austria.
Nov. 25, 1945—Austrian free election. Peoples Party wins majority. Communist party poor third.
Dec. 18, 1945—Dr. Karl Renner elected President.
April 1, 1946—UNRRA takes over responsibility of distributing food and supplies.
June 28, 1946—New control agreement for Austria approved for restoring trade, restitution of properties, etc.

Soviets Pocket Profit

The Austrian petroleum industry is a source of tremendous revenue to the Russian occupying forces. They have no capital investment, no amortization and they sell the entire production against cash in advance. The funds are used to defray some of their extremely lavish occupation costs and no expense is too great to them providing it offers any possibility of converting the people to their political beliefs. While they are demanding cash in advance from all distributors, they consistently refuse to pay American and British crude oil producers for their crude or the refineries for the finished products. The current Soviet indebtedness to American and British interests alone as to September 1 approximates 20 million Austrian schillings ($2 million). Despite overtures on every possible official level and by direct attempts by the companies themselves, these sums, representing working capital, have been accumulating for many months and it would appear as though it represents a definite attempt by the Russians to freeze American and British interests out of the oil industry in Austria. These outstandings represent deliveries of agreed quantities, agreed qualities at agreed prices and there exists no dispute whatever but the Russians find pretext after pretext to evade payment. There is no question that this represents a definite Russian policy against American and British interests. The opinion in Vienna is extremely pessimistic and it is universally felt that relief is possible only from sufficient pressure at the highest level by Washington and London on Moscow. With minor variations, it is the identical theme being used by the Russians against American and British interests in Hungary, in Roumania, in Bulgaria and in Jugoslavia and indirectly in Poland and Czechoslovakia where American and British interests have been nationalized and seized without any compensation whatever to their rightful owners.

Problem of the Danube

The Danube River as a transportation gateway for all commerce, including petroleum must be mentioned. What the Russians have done in the petroleum industry they have tried to do in Austria as far as the Donau-Dampfschiffahrts-Gesselschaft is concerned, claiming it to be German assets. British, American and French elements in the Allied Council support the Austrians in the fact that this was a forced sale to the Germans. Large numbers of the prewar Danubian fleet are in the American Zone and the Americans refuse to release these ships until the Soviets admit its Austrian ownership. One of the big bones of contention, insofar as the Danubian Basin is concerned, is the internationalization of the Danube River demanded by the western powers and strongly opposed by the Russians. In Roumania, the Russian-Roumanian Danube Company has been formed which controls all transportation on the Danube within the boundaries of that country. The same is true in Jugoslavia and in Hungary. These companies, although 50 percent Russian and 50 percent local capital, are entirely under the Soviet domination and control and if the Austrians permit such an arrangement in Austria, the entire Danube will be Russianized.

The Soviets recently submitted an application to the Austrian government for a trade license for a Russian distributing company (Oesterreichisch-Russjsche Oelprodukte Gesellschaft) of petroleum products. This company would replace the Benzol-Verband in the Russian Zone and Vienna and would also permit the Russians to distribute in the American, British, and French zones under Austrian law, where at present they are not represented. There were no reasons why the Austrian government could refuse this application, submitted entirely in accordance with Austrian law,

and the license has been granted. However, the Austrian government has stated that in granting this license all other petroleum distributors in the country should be given reciprocal treatment in the Russian Zone and Vienna, where they are now denied any activity by the Soviets. Whether the Austrian government, supported by the American mission, will be successful in the endeavor to break the Russian distributing monopoly in the Russian Zone remains to be seen. The company has just been formed and is reported to have started operations as of October 1.

Seek 50-50 Company

The Austrian government daily is under tremendous pressure from the Russians for every possible type of concession. That they have so well withstood this tremendous pressure speaks greatly to their credit, but the other Allied powers have encouraged and aided the Austrian government whenever the right to manage its own affairs have been challenged. General Clark and Minister John Erhardt, with their very able staffs, have done everything possible to allow the Austrian government to function under the controls set up by the Allied Council.

For many months the Russians have been endeavoring to force the Austrian government to form a petroleum company on a 50-50 basis comprising production, manufacturing and distribution, as they have done in Roumania and elsewhere. The Russian contribution to such a company would be the so-called German assets which they have seized but which all the rest of us contend do not belong to them, while the Austrian contribution would be the remaining companies which were supposed to have been nationalized. The pressure to put through such a company has been tremendous and continues to be exerted on every possible occasion. To this date, strongly supported by the American, British and French elements, the Austrians have resisted and informed opinion is to the effect that they will continue to resist.

On July 26 the Austrian Parliament unanimously passed a law to nationalize many specifically named industries. This law was passed not because of political ideologies but rather was a desperate attempt to recover those so-called German assets which the Russians have seized. The law stated that adequate compensation would be provided by subsequent enabling legislation. It was fully realized by all concerned that Austria was in no position either now or in the foreseeable future to provide any compensation whatsoever for foreign property included in the nationalization law. Both Socony-Vacuum Oil Company and Royal Dutch-Shell and their local subsidiaries are among those named in the list attached to the law.

TABLE 3

Crude Oil Production in Austria

YEAR	Metric Tons	Barrels
1930	45.6	309
1931	.....	.....
1932	72.6	492
1933	803.7	5,446
1934	4,124.0	27,944
1935	6,658.0	45,115
1936	7,418.0	50,264
1937	32,849.0	222,585
1938	56,657.0	383,908
1939	144,925.0	982,012
1940	412,452.0	2,794,775
1941	623,900.0	4,227,546
1942	867,802.0	5,880,226
1943	1,103,200.0	7,475,283
1944	1,213,033.0	8,219,512
1945[1]	235,060.0	1,592,767
1945[2]	218,539.0	1,480,820
1946 PRODUCTION		
January	55,638.0	377,003
February	57,737.0	391,226
March	74,037.0	501,675
April	70,217.0	475,790
May	71,908.0	487,249
June	73,290.0	496,613
July	76,091.0	515,592
Total 7 Months	478,918.0	3,245,148

[1] Before end of war. [2] After end of war.

Russian Shoe Pinches

The Russians protested the right of the Austrian government to nationalize what they consider to be their property, although they expressed satisfaction with nationalization in general. The situation developed which placed the Soviets in an extremely unfavorable political position as they found themselves in the capitalistic camp strenuously fighting against the expropriation of their property which has always been one of their fundamental doctrines. Before this law became effective General Clark informed Chancellor Figl that nationalization of American interests, while so-called Russian interests were not nationalized, amounted to discrimination and as such could not be tolerated. The British element sent a similar note. A reply was received from Chancellor Figl to the effect that American interests would not be nationalized until a compensation law had been passed and even after the passing of such a law, the properties would not be taken over until adequate and satisfactory compensation could be provided including all properties. The law actually became effective on September 17, but for all practical purposes there is no change whatever in the status of American and British property and from what can be seen, there will be no change.

Final determination of the intent of the Potsdam Agreement, the determination of what are and what are not external German assets, the rights to properties and materials in respective occupied zones now in possession of the respective Allied armies, the submission of and acceptance of proofs of ownerships now disputed have important bearings on the eventual solution of the oil and other problems. Different ideologies exist particularly those of the East as opposed to those of the West. At present almost unreconcilable, they will require the most careful of analysis and comparison. Language barriers rear in ugly form. Particularly in the Russian language are found words which although similar in construction have a quite different meaning or interpretation or perhaps words and expressions commonly used by western countries are completely lacking in the Russian tongue. These contribute added difficulties.

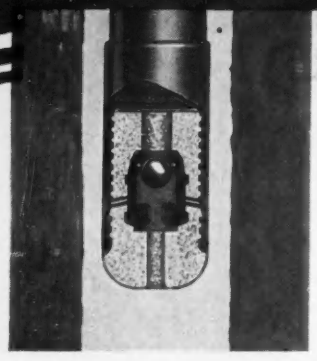
Tolerance and Patience Advised

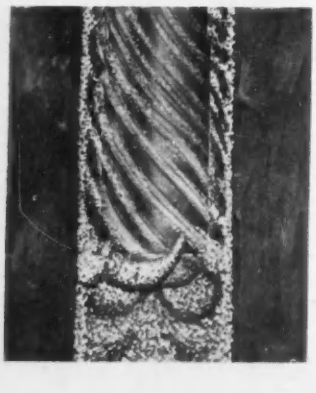
Inexperience in discussing or determining questions arising between various countries with which our own country has dealt for years thereby resulting in accelerated presentation also handicaps. Inability to express ourselves in terms which the Russian mind can absorb quickly has created a suspicious attitude. Extremely slow have been normal results from negotiations and there has developed an attitude which to the United States appears to be one of procrastination. The vastness and scope of the problems has been too far reaching for the Soviet representatives to grasp and with the complete centralization of authority in Moscow, all groups in the Soviet element of the Allied Council have had to wait until the subjects presented by the others powers have been analyzed and direction and procedure dictated by Moscow. These and other conditions have prevented progress in negotiations. Then again, the Soviet conception of ownership is vastly different from that of most other countries. There is almost no private ownership in Russia—it is something that the Russian mind cannot conceive. Their rights are determined by their own interpretation of the written word or expression or order from Moscow. Nothing else can be considered. We must exert a complete effort to impose our conception and beliefs through comparative means, analyzing each and every word and finding a definition which will brook of no disagreement once determined. Extreme patience must be the rule in attempting to make the Soviet see and understand the ways of the world as compared with their own limited and sheltered ways. With the proper degree of tolerance, as exhibited by our country, it is hoped possible that what now appears to be unsurmountable, may be equitably resolved without threat of force or danger to a continuing peace.

YOU ARE NOT GAMBLING WHEN YOU

Give it a Whirl"

The odds are in your favor for a successful, permanent water shut-off when you give the cement slurry a "whirl" downward, then upward, around that vital point . . . *the shoe joint.*





Here's how the casing string is safely guided and floated in with a Baker Cement Wash-Down WHIRLER Float Shoe, its rounded concrete nose leading the casing past any sidewall irregularities. Floating-in is safely performed by means of the Baker Ball-Type Back-Pressure Valve which prevents the passage of fluid up through the bottom of the pipe while running in.

Here's how bridges are removed and washing-down is performed by the downward hydraulicking action of the circulating fluid through the baffled WHIRLER ports and the restricted bottom passageway. Years of experience have proved that the "engineered" angle of the down-whirler ports, and the combined area of these outlets in balance with the bottom outlet, effectively disintegrate and circulate away bridges and similar obstructions.

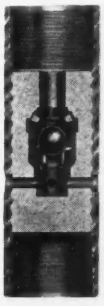
Here's how mud cake is removed and the hole conditioned for successful cementing by the WHIRLING motion given to the fluid when the formation is washed and conditioned. The DOWN-WHIRLER ports direct the fluid at an *angle* which insures effective removal of the mud cake but does *not* break down heaving or crumbling formations. The original formation is left clean for bonding with the cement slurry.

Here's how the slurry is WHIRLED—first down, then up—to encase the shoe joint completely with a continuous body of cement. The critical area at the shoe as well as the casing up the hole, is encased by the cement slurry, and the WHIRLING action minimizes the hazard of channeling. An added feature is the ease of drilling out and circulating away the plastic valve assembly and the concrete plug.

USE BAKER

All of the basic BAKER features of Strength, Valve Efficiency and Drillability are present, PLUS the vital ability of WHIRLING the circulating fluid, and then the cement slurry, described and illustrated on the opposite page. Here you can clearly see the plastic ball in cementing position, with ample passageways for fluid circulation—also the baffled ports which direct the fluid, or cement slurry, downward with a WHIRLING motion—also the recessed rubber seat for the buoyant ball which floats upward to a leak-proof seal at the slightest reversal of pressure. This is your best bet for successful, "first-time" cementing.

This is the Baker Cement Wash-Down WHIRLER Guide Shoe (Product No. 121) which is used by many modern operators who demand the advantages of WHIRLING the cement slurry, but prefer to have a Baker Cement Float Collar positioned a joint or two above the shoe where it will serve as a stop for the cementing plug, thus retaining any cement "tailings" inside the casing. Successful Guiding, Floating and Cementing plus WHIRLING are assured with this combination.



Baker Cement WHIRLER Float Collars with Solid Baffle (Product No. 305) are used for cementing casing at any desired depth, and are particularly adaptable for cementing a combination string where the upper portion is to be used as a water string and the lower portion as on oil string. The downward WHIRLING of the cement slurry continues as the slurry starts upward, to afford uniform cement distribution with minimum danger of channeling.

Baker Duplex Cement Wash-Down WHIRLER Shoes (Product No. 360) are used to perform the lower stage (at the shoe) of a two-stage cementing job, or to run in and cement a liner either landed on bottom or up the hole, the top of the liner being either below the casing shoe or lapping into the casing.

Baker Metal Petal Baskets (Product No. 340) play an indispensable part in WHIRLER cementing when used with Baker Cement WHIRLER Type Collars. These Baskets are constructed with metal petals which overlap in expanded position and serve as a bridge to protect the formation below from cement contamination, sloughings or cavings. They are run on casing or liner, either fixed or slideable, in combination with Hook-up Nipples and WHIRLER Type Collars (illustrated at left), as well as in Double Basket and Inverted Basket Assemblies for a wide range of cementing applications, many of which would be extremely difficult to perform if Baker Metal Petal Baskets were not available.

There are other units of Baker Equipment for those "special" cementing jobs . . . MULTIPLEX Equipment for multi-stage jobs—TRIPLEX Cementing Shoes for up-the-hole cementing when lower zones are to be protected from cement contamination—CEMENT RETAINERS for squeeze cementing and remedial work. The Baker man in your area will give you courteous, intelligent assistance.

"Whirler" CEMENTING EQUIPMENT

BAKER OIL TOOLS, INC.

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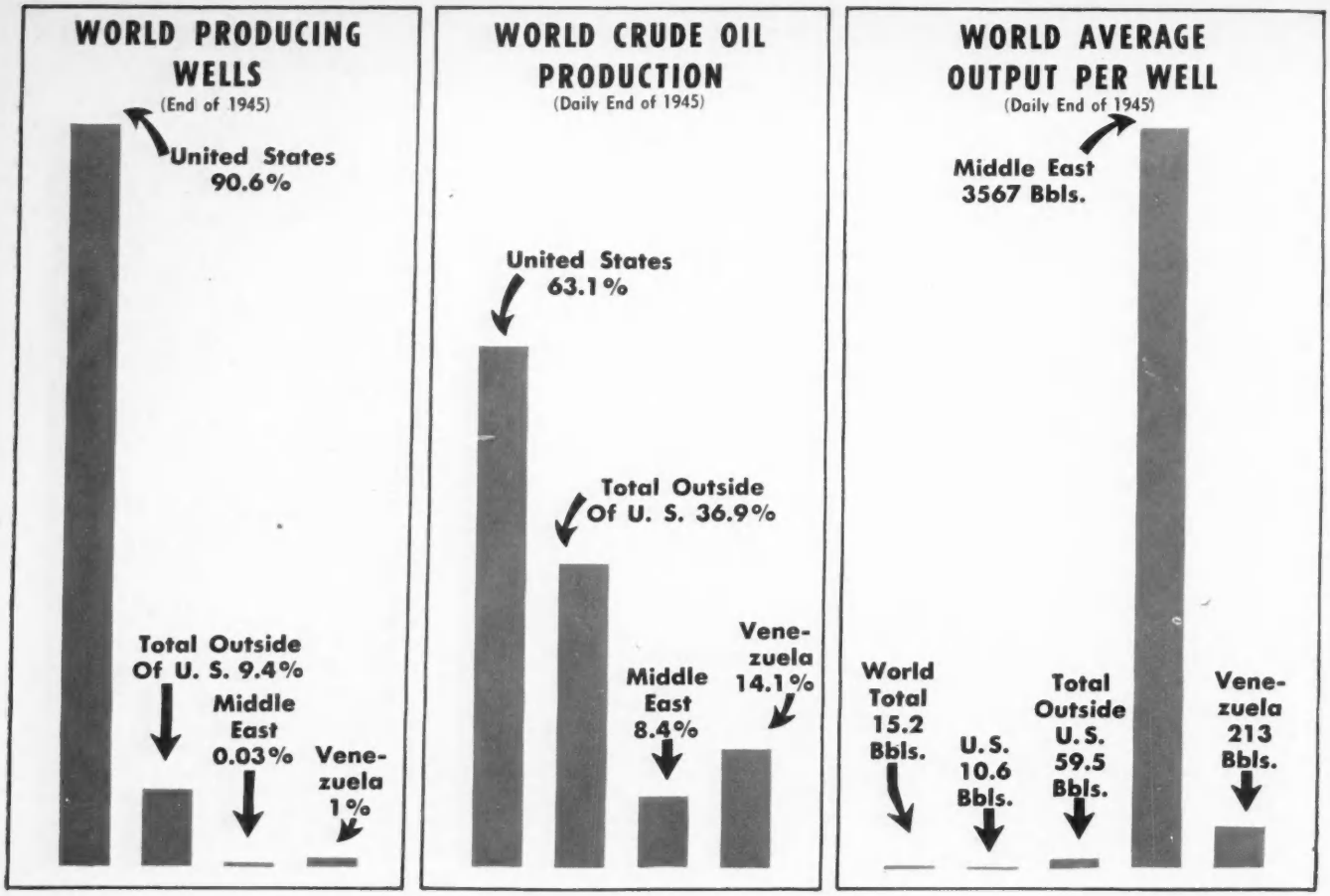

Producing Oil Wells

Countries outside the U. S. have 9.4 percent of all wells but produce 36.9 percent of oil

AT THE CLOSE of 1945 countries outside the United States were producing on full capacity basis, turning out as much petroleum as could be physically handled by the available transportation and refining facilities, in meeting heavy postwar requirements. Production abroad was proceeding at the highest level in history, and it is noteworthy that limits upon it were imposed primarily by transportation and refining capacities rather than by the producing ability of existing wells. Even in war-devastated areas, where many wells were destroyed or damaged, refining and transportation also had been disrupted, and rehabilitation of refineries was as essential as drilling of wells.

This adequacy of producing ability abroad stood in contrast with the situation in the United States, where producing ability had been taxed virtually to its limits in the closing phases of the war, and where there was growing concern over the possibility that domestic production might be less than domestic requirements in the future.

Difficulties

Figures on world-wide production and producing wells, comprising actual data for numerous countries and estimates for the remainder, throw into sharp contrast a relative ease of producing oil in some areas outside the United States and a relative difficulty of producing it within the U. S. This contrast is presented in considering the relatively larger number of wells operated in the United States for a given volume of production, the lower per-well output of U. S. wells, and the lower U. S. proportion of flowing production.

As tabulated herewith, world production averaged approximately 7,077,933 barrels daily at the close of 1945 and came from 465,268 producing oil wells, indicating an average output of 15.2 barrels daily per well. Of the producing wells, 57,660 were flowing naturally and 407,608 were producing by artificial lift.

Countries outside the United States accounted for 2,609,933 barrels of production per day or 36.9 percent of the world total. But they accounted for this large proportion of world production by operating only 43,835 producing oil wells or 9.4 percent of the world total of wells. Furthermore, while they had only 9.4 percent of the producing wells, they held 14.9 percent of the world's flowing wells and but 8.7 percent of the world's wells requiring artificial lift. These figures indicated that wells outside the United States were producing on the average 59.5 barrels daily per well, or nearly six times the U. S. average, with some countries showing per-well output that appeared incredible by U. S. standards.

The above figures stood in marked contrast with corresponding data for the United States. At the end of 1945 the U. S. was producing 4,468,000 barrels of crude petroleum per day or 63.1 percent of the world total. But in thus accounting for less than two thirds of world production it operated 421,433 producing oil wells or 90.6 percent of all in the world. It held, however, only 85.1 percent of the world's flowing wells, while accounting for 91.3 percent of the wells on artificial lift. The wells in the United States were producing on the average 10.6 barrels per well per day, and they pulled the world average down to the

15.2 barrels daily per well in the face of the average output of 59.5 barrels daily per well abroad.

The world's most prolific wells today are those in the Middle East. At the close of 1945 that region was producing 595,650 barrels daily or 8.4 percent of the world total output, and that production came from only about 167 producing oil wells, or a very small fraction of 1 percent of the world's 465,268 wells, indicating an average of 3567 barrels daily per well. In Iran 59 wells yielded 402,450 barrels daily, for the world's best average of 6821 barrels daily per well. Iraq produced 90,000 barrels daily from 14 wells, an average of 6429 daily per well; Saudi Arabia 83,200 daily from 32 wells averaging 2600 per day each; and Bahrein Island 20,000 daily from 62 wells averaging 323 per day. In addition to these producing wells there were some oil wells in the Middle East shut in and also some observation wells for watching oil-gas and oil-water contacts. Kuwait and Qatar had several oil wells shut in awaiting markets.

The fields of the Middle East are truly wonder fields. Although produced scientifically and in accordance with advanced engineering methods, wells produce regularly at rates reminiscent of the open flow of "gushers" of the past, and will be capable of maintaining those high rates for years. The average output of the Iranian wells at the close of 1945 was at the rate of nearly 2½ million barrels per well per year, whereas U. S. wells with life-time output of a million barrels or more were rare even in the past.

In the Middle East more of these highly prolific fields await development and it is believed that numerous others await discovery. Huge reserves, comparable with total U. S. reserves, are already proved, and large additional reserves are indicated. For the future, therefore, the Middle East may be expected to continue as the world's outstanding region for producing oil with a minimum of effort.

Venezuela's Role

Not so phenomenal as the Middle East but also contrasting with the United States is Venezuela, the world's second largest producing country. At the close of 1945 Venezuela was producing 1,001,850 barrels daily, or 14.1 percent of the world output. Yet that production came from only 4699 wells, which represented merely about 1 percent of the world's 465,268 producing oil wells. The Venezuelan wells were producing on the average 213 barrels daily per well, with more than a third of them flowing. This average was far less than in Iran, Iraq, and Saudi Arabia, but approached the average for Bahrein Island and was equaled in the United States only in a few exceptional flush fields.

In Colombia producing wells averaged about 59 barrels daily at the close of 1945, much better than the U. S. average, but other South American countries showed pre-well production similar to that in the U. S. although generally somewhat higher.

In producing 26,200 barrels daily from 143 wells at the end of 1945, Egypt showed an average output of 183 barrels daily per well, which was not greatly below Venezuelan average.

Some of the countries of Europe show relatively meager production per well, with output much less than from U. S. wells, but the more important producing countries including Russia, Roumania, Austria, and Hungary are indicated to be producing at higher per-well rates than the United States. However, for the purpose of this study, it was necessary to make estimates for a good part of Europe, based on indicated current production trends and information from the past on producing wells, because actual data were not available except for several countries.

Only limited information was available, likewise, for the Far East, and estimates were necessary, based on fairly reliable figures on current production and information from the past on producing wells. These estimates indicated that wells in the Far East had daily average production comparable with the United States average.

Producing Oil Wells and Their Output at End of 1945, by Countries

COUNTRY	Oil Wells Shut-in	OIL WELLS PRODUCING			Daily Average Production	Barrels Daily Per Well
		Flowing	Artificial Lift	Total Producing		
North America Except U.S.:						
Canada	112	290	1,639	1,929	20,250	10.5
Cuba	.....	.....	225	225	475	2.1
Mexico	224	864	177	1,041	118,912	114.3
Total North America Outside U.S.	336	1,154	2,041	3,195	139,637	43.7
South America:						
Argentina	.....	*155	*3,785	3,940	62,000	15.7
Bolivia (1944 data)	5	10	12	22	985	44.7
Brazil	15	.....	8	8	83	10.3
Colombia	.....	*125	*925	*1,050	62,350	59.3
Ecuador	97	59	610	669	7,700	11.5
Peru	5	193	2,696	2,889	37,665	13.0
Trinidad (1944 data)	1,226	651	1,023	1,674	60,466	36.1
Venezuela	300	1,777	2,922	4,699	1,001,850	213.2
Total South America	1,648	2,970	11,981	14,951	1,233,099	82.5
Europe:						
Albania	.....	.....	*325	*325	1,850	5.7
Austria (1944 data)	.....	350	60	410	23,975	58.5
Czechoslovakia	.....	.....	*25	*25	*500	20.0
England	7	.....	233	233	1,325	5.7
France	.....	.....	616	616	750	1.2
Germany	.....	.....	*2,000	*2,000	10,325	5.2
Hungary	.....	*200	*37	237	14,817	62.5
Italy	.....	.....	*500	*500	125	0.3
Netherlands	.....	.....	*20	*20	115	5.7
Poland	.....	.....	*1,125	*1,125	2,100	1.9
Roumania	.....	*1,200	*800	*2,000	94,450	47.2
Russia (Incl. E. Poland)	.....	*2,300	*8,900	*11,200	400,000	35.7
Yugoslavia	.....	6	.....	6	600	100.0
Total Europe	.....	4,056	14,641	18,697	550,932	29.5
Africa:						
Algeria	.....	.....	8	8	35	4.4
Egypt	32	24	119	143	26,200	183.2
Morocco	8	2	63	65	75	1.2
Total Africa	40	26	190	216	26,310	121.8
Middle East:						
Bahrein Island	12	62	.....	62	20,000	322.6
Iran	38	59	.....	59	402,450	6,821.2
Iraq	89	14	.....	14	90,000	6,428.6
Kuwait	9	.....	.....	.....	.....	.....
Qatar	2	.....	.....	.....	.....	.....
Saudi Arabia	1	32	.....	32	83,200	2,600.0
Total Middle East	220	167	.....	167	595,650	3,566.8
Far East:						
British Borneo	.....	*5	*155	*160	5,750	35.9
Burma	.....	.....	*275	*275	1,500	5.5
China	16	9	.....	9	1,500	166.7
India, British	.....	.....	*375	*375	5,500	14.7
Japan	.....	35	4,805	4,840	4,250	0.9
Netherlands, East Indies	.....	*25	*740	*765	29,000	37.9
New Zealand	.....	.....	*10	*10	5	0.5
Sakhalin	.....	*125	*50	*175	16,800	96.0
Total Far East	.....	199	6,410	6,609	64,305	9.7
Total Foreign	.....	8,572	35,263	43,835	2,609,933	59.5
(Percent of World)	.....	14.9	8.7	9.4	36.9	.....
United States	.....	49,088	372,345	421,433	4,468,000	10.6
(Percent of World)	.....	85.1	91.3	90.6	63.1	.....
Total, World	.....	57,660	407,608	465,268	7,077,933	15.2

* Estimated.

Poland's

THREE-YEAR OIL PLAN

BUILDING up of domestic production to the level which would permit satisfying of all of the domestic demand for crude and crude oil products is the goal which the Polish oil industry set for itself for year 1948. This, what may be termed, "three-year plan," must be carried out under most difficult circumstances, considering the thorough destruction left by war, the intensive rate of production of the wells during the German occupation and the fact that annexation by the Soviet Union of the eastern portion of Poland deprived the Polish oil industry of four-fifths of its pre-war potential. Data on the outline of this plan and information on how the plan is progressing are contained in the recent issues of *Nafta,* an official organ of the Polish CZPPP (Central Governing Body of the Industry of Liquid Fuels). The following article is based on data presented by this publication.

The plan embraces all the phases of the oil industry. Special emphasis is placed on exploratory work, having as its purpose development of new reserves. This is the most important and most immediate problem. Paralleling this problem is the question of rebuilding of machine shops which are to furnish and to service the equipment needed in drilling and production operations. Increased efficiency of wells now producing, by use of different types of re-conditioning work, and increased recovery, by application of secondary recovery methods is now planned and considered. Rebuilding and modernization of refineries is under way. Creation of the synthetic fuels industry has been started.

To further the development and the progress of the plan certain degree of decentralization of the executive authority has been instituted. The CZPPP is the central governing and coordinating body of the completely nationalized industry. Different departments, such as Department of Exploration, Department of Production, etc., have been entrusted with execution of their phases of the plan. Each department is represented in the CZPPP. Directors of the departments have considerable authority in regard to technical questions pertaining to their work. Whenever possible, the headquarters of the department are located at the point of the principal activity of the phase of the plan in which this particular department is interested. For instance, the headquarters of the Department of Synthetic fuels are located at Dwory near Oswiecim, where a large synthetic fuels plant is now being constructed.

The plan calls for drilling of a total of at least 108,000 feet during the year 1946. A total of 41,169 feet was drilled during the first six months of the year.

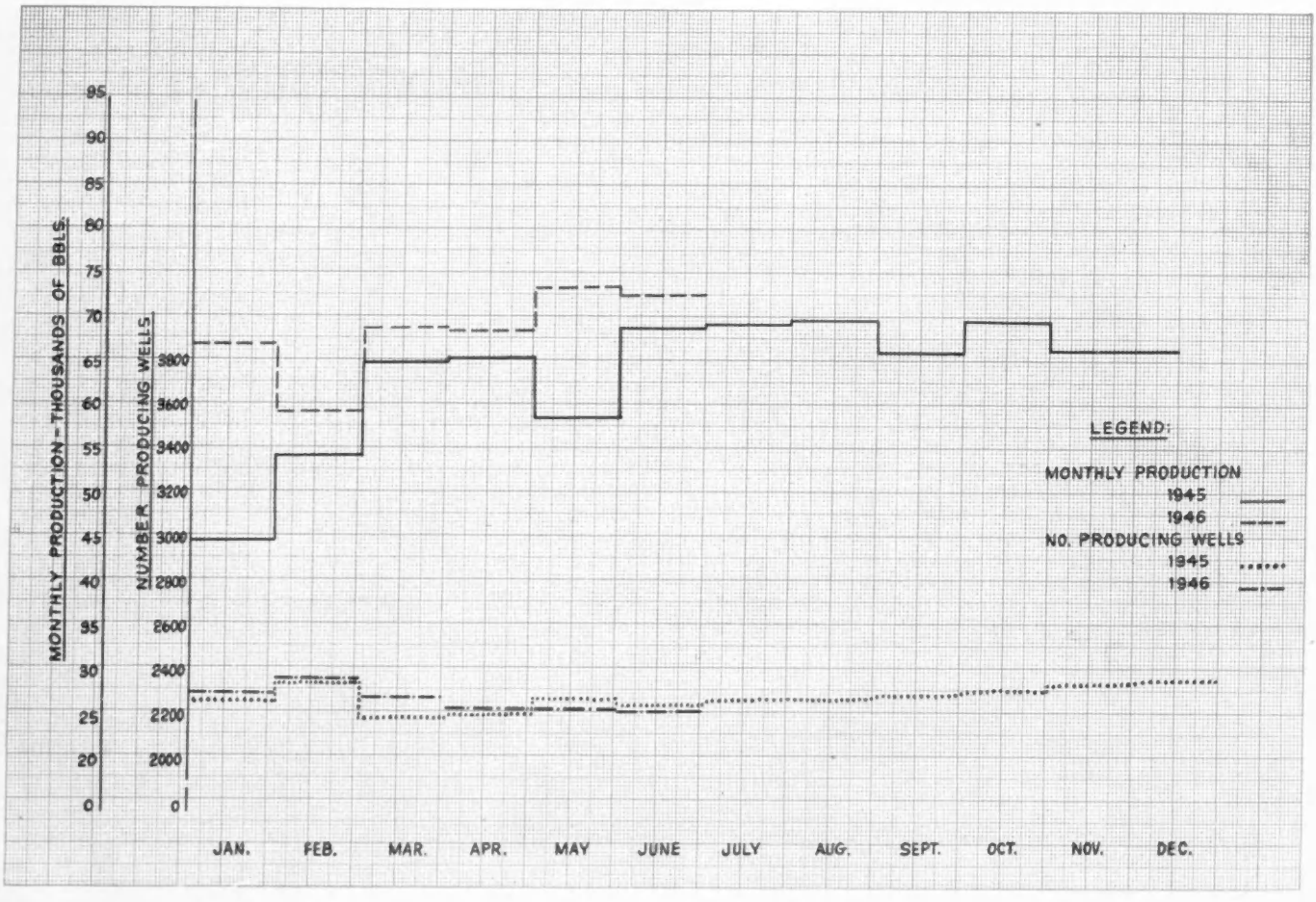

Figure 1. Chart shows monthly production and number of producing wells in Poland

TABLE 1

Data on Drilling Operations of the Polish Oil Industry

MONTH	No. WELLS DRILLING		No. FEET DRILLED		No. WELLS COMPLETED			
	New and Workovers in Proven Fields	Exploratory	New and Workovers in Proven Fields	Exploratory	New and Workovers in Proven Fields		Exploratory	
					Producing	Dry	Producing	Dry
Mar.—1946.	38	5	4,407	918	4	..	..	..
April—1946.	43	5	5,871	1,251	8	2	..	..
May—1946	41	8	7,914	2,124	9	..	..	..
June—1946	40	12	6,816	2,337	8	1	..	..

Of this 7419 feet represented exploratory drilling and the balance of 33,750 feet represented new and workover drilling in proven territories. While this amount of footage drilled is behind the proposed schedule the number of the feet drilled, particularly the footage of the exploratory drilling, increased from months to months and the goal set for the year should be attained. Data on footage drilled are shown in Table 1.

The footage drilled during the year is to be distributed among 93 wells. Of this total 16 wells are to be of the exploratory type. The deepest well is projected to 7500 feet. Deeper and more intensified exploratory drilling is planned for the future. Under current plans 180,000 feet of exploratory drilling alone is the goal set for 1948.

The principal cause of the slow drilling progress is lack of equipment and of repair parts. It is not uncommon for a rig to be shut down for weeks while waiting for a minor repair part, which is not available locally and may have to be imported. Rebuilding is, therefore, rushed of large machine shops in Glinnik Mariompolski and Bialo. When completed, these shops will be in position not only to service the drilling and producing equipment now in operation, but will be also capable of building a large part of the new equipment needed.

The Polish purchasing commission, in the United States, acquired several completed light, medium and heavy rotary rigs. Another commission is touring the American and British occupation zones of Germany looking for equipment which the Germans moved from Poland prior to their retreat before the Soviet armies. Six hundred car loads of such equipment, including ten complete rotary rigs, have been recovered so far. This equipment is to be moved back to Poland in the near future.

TABLE 2

Data on Production Operations of the Polish Oil Industry

MONTH	GROSS PRODUCTION IN BARRELS	
	For the Month	Cumulative for the Year
April—1946...	68,644	265,328
May—1946...	73,814	339,142
June—1946...	72,562	411,704

Exploratory drilling is concentrated on old geological and geophysical prospects. Most of the records of the extensive pre-war geophysical surveys have been either destroyed or moved to Germany. The same is true of the geophysical equipment. Some of the best Polish geophysicists, trained in the United States, were killed either during the invasion or during the occupation. New personnel is being trained and geophysical work is already proceeding with whatever equipment is available. Fortunately, many of the older Polish geologists, some of them internationally known, lived through the war and have already taken up their war-interrupted studies.

Production

Under the proposed plan a total of 962,000 barrels of oil is to be produced during 1946. As shown in Table 2 a total of 411,704 barrels was produced through June, 1946. Chart shown in Figure 1 indicates that after the initial increase during the first half of the year the average production appears to be pretty well settled. Therefore, unless the wells now drilling or still to be drilled during the second half of the year, contribute considerable new production, the goal set for the year may be not attained. For year 1948 the plan calls for production of a minimum of 2,960,000 barrels.

As far as production of old fields is concerned the tendency is to concentrate on development of more efficient production practices and on application of different secondary-recovery methods. To be sure, new locations are being drilled within the proven limits of the fields, but this campaign is to be curtailed in order to concentrate all the available equipment on exploratory drilling. The same is true of different types of workovers, including deepening.

Improved production practices include a systematic campaign of shooting and cleaning of wells with particular emphasis on paraffin removal. Scarcity of pumping equipment such as working barrels, plungers and cups had a very bad effect on output of individual wells. As good equipment becomes more plentiful the increased efficiency of operations should contribute toward increased production.

Six small scale repressuring projects have been started and a total of 25 such projects is to be in operation by the end of 1946. Preliminary work is now in progress for mining of shallow horizons in Lipinki and Stara Wies fields. In this latter area the shaft topped the oil bearing sand at the depth of 302 feet and equipment is now installed for exploitation. Plans are being worked out for water-flooding operations in a number of fields.

Refining

The difficulties of the refining branch of the Polish oil industry are equally large.

Even before the war Polish refineries did not keep pace with the progress in technological development made by the refining industry of other countries. Most of the Polish refineries were built in the 20's and, as the crude production of Poland continued to decline, several plants had to shut down, because of lack of crude, while modernization of others was neglected. Also, most of the refineries were designed to handle the crude from the Boryslaw area. The fields of this area are now in Soviet territory. Even under normal conditions, therefore, modernization of these refineries and their adaptation to handling of crude from fields in western portion of Poland would represent considerable task.

TABLE 3

Data on Refining Operations of the Polish Oil Industry

MONTH	Monthly Crude Oil Throughput—in Barrels
March—1946.....	55,510
April—1946.....	66,222
May—1946.....	73,560
June—1946.....	65,874

During the occupation the refineries were operated by the Germans in a most intensive manner. To avoid any shut downs only these repairs were made which were absolutely essential. As a result this equipment which was left by the Germans is completely worn out. The Germans were also most thorough in removing to Germany, prior to their retreat, all of the refining equipment which was at all movable.

Refineries in Glinnik, Czechowice and Trzebinia suffered considerably from allied air raids. The Czechowice refinery was further damaged, being located, for several weeks, in actual front lines.

Only one small refinery in Ligocie was left undamaged by the war. It was put in an immediate operation. Rebuilding of others is proceeding. The refinery in Trzebinia has been made

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Three Urgent Problems at Paris

Oil AT THE Peace Conference

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THE Paris Peace Conference, which ended October 15, was called to consider the draft treaties of five ex-enemy countries: Roumania, Hungary, Italy, Finland and Bulgaria. The first three of these countries are oil producers, and as such the effect of the conference's recommendations on the oil industry of each is of great interest. In these countries are oil properties valued at many millions of dollars owned by the nationals or the governments of Great Britain, the United States, France and Holland. It was the author's privilege while in Paris to meet and discuss the problems of petroleum with oil men and government officials attending the conference.

Before considering the oil problems it is necessary to point out the organization of the Conference and how it approached the situation. Twenty-one allied countries, all directly affected by the past war, with the five former enemy countries named above, sent representatives to Paris to discuss and clarify proposed forms or drafts of treaties of peace. The work of the conference was divided into nine categories, each category being represented by a commission comprising delegates most interested with that particular problem. There were two Economic commissions, one for Italy and one for the other four countries. There were five Political and Territorial commissions, one for each of the former belligerents. There was a Legal and Drafting Commission and one Military Commission. Oil matters were handled by the two Economic commissions.

Importance of Oil

The United States members of the Economic commission were W. L. Thorp, deputy to Undersecretary of State William Clayton; J. J. Reinstein, economic advisor; and John A. Loftus, economic advisor. The importance of oil in the Conference was emphasized by the fact that Mr. Loftus is chief of the Petroleum Division of the State Department in Washington, and was brought over due to his experience in oil matters in Central Europe and the Near East. Other members of the Economic commissions were from the Allied countries most directly affected by the matters.

The three urgent oil problems before the Conference were (1) compensation, (2) general economic relations, and (3) reparations. Under the first of these, each of the five countries is required to restore the properties of United Nations governments or nationals as rapidly as possible. In the oil countries, much of the property was destroyed or badly damaged and endless complications arose as to when and by whom this was done, when and by whom it must be restored and in what currency and what rate of exchange. The former belligerents are expected to return or restore such properties and titles as of the date of their respective participation in the war, for Roumania June 22, 1941; Italy, June 10, 1940, and Hungary, April 10, 1941.

Soviets Oppose Plan

Compensation. Here the western Allies did not see eye to eye with the Soviets. The United States' position was that compensation for damage should be paid for in full, but was willing to cut off 25 per cent. The Soviets wanted compensations paid in the basis of one-third the damage sustained with payment in local currency of the country, the basis of their argument being that they were getting less than a third of their reparations claims from the respective countries. The British insisted on 100 per cent compensation, the French proposed 75 percent. The Economic commissions by majority vote recommended 75 per cent, and so it was carried by the plenary session of the full Peace Conference, with the Soviets still voting against it.

The vexing problem of subsidiary ownership of oil properties is far from settled and directly bears on the prime problem of compensation. Subsidiary American and British oil companies, operated under Roumanian and Italian names were taken over by enemy governments. The Soviets have not relinquished claims on all such properties in the Soviet zone of occupation, basing their arguments on the Potsdam Agreement. The United States' position, that real and parent ownership should apply and the properties be so treated, was opposed by the Soviets both in the Economic Commission and the plenary session and in both cases simple majority votes were in favor of the United States position.

General Economic Relations. Here are two special problems of interest to oil men, the so-called "national and most favored nation treatment," and the problem of "neighboring countries." Briefly, the first points out that ex-enemy countries must and shall give to all United Nations nationals most favored nation treatment and national treatment. For example, if Italy grants Bulgaria economic privileges then she must extend the same to the United States or any other United Nations member. Under national treatment, Italy cannot discriminate between Italians and United Nations nationals. There was some disagreement to these provisions, due to language proposed by Russians that would have left intact Soviet interest in such joint companies as Sovrompetrol in Roumania. Anglo-American language required that all countries enjoy the same rights, for example, as Russia, in all the former belligerent countries, especially Roumania. Here again the Anglo-American-French wording was carried by a simple majority.

U. S. Again Upheld

The problem of neighboring countries, in the language proposed by the Soviets, would have permitted the creation of a closed economic bloc in Eastern Europe by exempting trade between neighboring countries from the most favored nation rule. This was obviously opposed by the United States and again the latter's position was sustained by simple majority vote of the commission and the Conference.

Reparations. This problem is more or less unique to Roumania. As it now stands Roumania is required to deliver, under the reparations agreement, to Russia physical goods in the amount of $300 million over an eight-year period, but at 1938 prices (which by now have risen in value to $450 million). One-half of these goods is petroleum and its products. The deal in Roumania is that the local government is purchasing the oil from the oil companies and paying in local currency. The price, however, is not sufficient to pay the oil companies to produce it and the companies' losses are rapidly mounting. Since 80 per cent of the Roumanian production is of American and British ownership, in effect

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Mexico DRILLING SHORT OF GOAL; WILDCATTING STRESSED

IT IS now indicated that Mexico will show in 1946 a moderate increase in well completions, similar percentagewise to the increase indicated for the United States. During 1945 Mexico had 53 completions, including 10 wildcats. For 1946 there will be recorded around 60 completions, judging by results from the beginning of the year up to the middle of August. In that period of 7½ months there were 36 completions, including 7 wildcats.

At the middle of September there were 17 wells drilling in Mexico, or about the same number as in the earlier part of the year, indicating no material change in completion rates for the rest of this year.

It is noteworthy that this year is bringing more wildcatting than last year, in accordance with plans which recognize the need for new reserves. Also, total completions are running higher than formerly in reflection of a planned increase. The 36 completions in the first 7½ months of 1946 were equivalent to a full year's drilling in each of several years prior to 1945.

While completions this year will probably total around 60 compared with the 53 of 1945, this increase will be materially less than the goal set up by Petroleos Mexicanos, the government oil company. In its drilling program for the year, Pemex set as its immediate objective the drilling of approximately 75 or 80 wells annually, including about 30 wildcats per year.

Equipment Needed

Among the causes of the lagging of drilling behind plans has been continued trouble in getting needed equipment, which comes largely from the United States.

Some additional complete drilling rigs will be required, along with some replacement units for rigs now used, for drilling to be increased to the planned levels. All available rigs are in use, and they show fair efficiency. This year the average rig in Mexico has accounted for a completion in about 3½ months, compared with a U. S. average of about 2½ months and an average of about 5½ months for all countries outside the United States.

For the longer-term future, Mexico very likely will have to drill considerably more wells than the 75 or 80 per year now sought. There would have to be more than 100 wildcats alone per year if Mexico were wildcatting as actively in relation to proved reserves and current production as the United States is doing. Mexico already is approaching the limits of maximum efficient producing rates. And while the installation of a pressure maintenance system at Poza Rica would provide a considerable increase of efficient producing ability, the necessity of new fields becomes increasingly urgent.

Completions in 1946

Of the 36 wells completed in Mexico this year up to mid-August, 11 were at Poza Rica, all oil producers, at depths of 7300 to 7850 feet. Another area of concentrated drilling was the Isthmus of Tehuantepec, where there were 15 completions, including 11 in El Plan field. The 11 El Plan completions included 8 commercial oil wells (7 in the 6000-6300 foot horizon and 1 at 2750 feet), 2 non-commercial oil wells (1 at 6100 feet and the other at 2800 feet), and 1 dry hole to 6250 feet. Two of the Isthmus completions were in the Cuichapa field and they were dry holes drilled to 2200-2400 feet, although the field has some production from other wells. The remaining 2 Isthmus completions were unsuccessful wildcats, including a 3086-foot dry hole on the Tecuanapilla prospect near Filisola field and a 5305-foot dry hole on La Venta prospect near El Burro field. The Isthmus fields and prospects are in a saline basin.

Of the 36 completions up to mid-August, 5 were in the "Southern District" or Golden Lane region, all having been unsuccessful wildcats. In the Castillo area two wells were abandoned below 7000 feet. A second test on the Soledad structure yielded salt water at 6979 feet, although some production from Soledad No. 1 in 1945 had given hope of an important discovery. Castillo and Soledad areas are to the west and south of the southern end of the Golden Lane. To the east of that end of the Golden Lane Asuncion No. 3 tested salt water at 3435 feet and was abandoned. Pemex's Tumbadero 5, Tumbadero hacienda, quit in salt water at 2936 feet.

Three of this year's completions were in the northern end of the Panuco heavy oil producing area to the west of Tampico. Located in Chapacao hacienda, two yielded salt water and were abandoned below 2000 feet and one was a non-commercial oil well at 1378 feet. The other 2 completions were gas producers in the Mision gas field near Reynosa on the Texas border, one having been drilled to 5863 feet and the other to 8046 feet.

Current Drilling

Current drilling shows about the same distribution as the above data on completions. At mid-September there were 6 wells drilling or in process of completion at Poza Rica field and 3 in El Plan field, while derricks were being erected for additional wells in both fields. Other Isthmus development consisted of two wildcats, Cabritos 1 and Sarlat 23. The well on the Cabritos prospect was ready to spud. That at Sarlat is on a faulted structure in the eastern part of the state of Tabasco, a long distance from El Plan and other Isthmus producing fields. Sarlat 23 blew out at 2454 feet in early September, and it was rumored that equipment was totally destroyed. Production was discovered at Sarlat in 1906 but subsequent drilling of about 25 wells netted only a few oil producers and the field never attained commercial status.

Besides the Poza Rica and Isthmus development, current drilling in Mexico includes two wildcats west of the Golden Lane, two semi-wildcats at the southwest edge of the Panuco field, and two wildcats in Northeastern Mexico in the gas and gas-distillate area near the

Texas border. Pemex's Tlacolula 7 is about 15 miles west of the Potrero del Llano pool in the middle section of the Golden Lane, and 9⅝-inch casing has been cemented at 1985 feet. The Tlacolula prospect is roughly in line with the Aragon, Soledad, and Castillo prospects and the Poza Rica field, along a trend paralleling the Golden Lane to the west. In wildcatting along this trend, there are hopes of discoveries of real importance, perhaps comparable with Poza Rica and the Golden Lane fields. These hopes were encouraged to some extent by the limited production obtained last year at Soledad under conditions somewhat similar to those at Poza Rica and also by showings at Castillo. The other wildcat currently being drilled in this general area is Pemex's Tepezintla 1, located about 8 miles west of the Cerro Azul section of the Golden Lane. This well is down to 5935 feet.

In the Panuco district the two wells drilling are Limon 114 and Limon 115 in the Hacienda Limon, near the southwest limits of present proved production. This field, which produces heavy crude, has possibilities for extension and the proving up of additional reserves.

Exploration Stressed

In Northeastern Mexico Pemex is drilling below 5050 feet in Las Norias 1 on a prospect not far to the southwest of the Mision gas-distillate field, the prospect being near the Nuevo Leon-Tamaulipas state line, and the present wildcat being in Nuevo Leon state. In the same general area Pemex is drilling below 2500 feet in Treviño 1, Municipios Reynosa y Matamoros, state of Tamaulipas.

Also in Northeastern Mexico, farther up the Rio Grande, is the Rancherias gas field, state of Tamaulipas, scene of the only private company drilling operation in Mexico at present. In that field Ohio Mex Oil Corporation's Rancherias 9 was spudded last spring but since reaching 1215 feet has been shut down.

As indicated by above data, the 17 wells being drilled by Pemex include for the whole country 6 wildcats (2 each in the Isthmus, Golden Lane region, and Northeastern Mexico); 2 semi-wildcats (in the Panuco district); and 9 field development wells (6 at Poza Rica and 3 at El Plan). The company therefore is currently devoting nearly 50 percent of its drilling to exploration for new reserves, even though total completions and wildcat completions will both be substantially less in 1946 than planned.

Poland's Oil Plan

• CONTINUED FROM PAGE 27

the principal base for storing and handling of the imported crude.

The proposed plan calls for handling by all the refineries a total of 962,000 barrels of crude during 1946. The actual throughput during the first half of 1946 amounted to only 392,627 barrels. Table 3 shows the monthly throughput for the four-month period ending June 30, 1946. It appears that unless monthly average is improved considerably during the second half of the year, the proposed goal will not be reached.

Synthetic Fuels

Prior to the war Poland did not have a synthetic fuels industry. Now, with actual crude production only a fraction of the prewar and in view of uncertainty inherent in any attempt to discover new reserves, development of the industry of synthetic fuels becomes most important.

Several modern and large synthetic fuels plants were built by Germans during the war in Poland and in the portion of Eastern Germany which is now Polish territory. These plants, however, have been either destroyed or dismantled and moved to the Soviet Union. By agreement with the Soviet government Poland received a large portion of the synthetic fuel plant located in Schwarzheide near Dresden, Germany. The plant, not a very modern one, is using the Fischer-Tropsch process. A group of Polish engineers and workers is at Schwarzheide becoming familiar with the process. The plant is being dismantled and moved to Poland where it will be located at Dwory near Oswiecim. The location has been selected for several seasons, one of which is its proximity to the Polish coal basin. Coal, of which Poland has practically unlimited supply, will be used as the main raw material.

Large portions of the plant, on which only plans and specifications have been obtained, must be built anew. It is expected that by the end of 1947 the project will be ready with yearly capacity of around 140,000 barrels. Ultimate expansion to capacity in excess of one million barrels per year is planned.

For the time being Poland depends primarily on imports of crude products needed in rehabilitating war damage, with UNRRA and the Soviet Union being the principal sources of imports. During June, 1946, a total of 54,043 metric tons of crude and crude products was imported. Of this 70 percent was furnished by UNRRA, 22 percent by the Soviet Union and the balance of 8 percent was imported from Roumania and Hungary.

Oil at the Peace Conference

• CONTINUED FROM PAGE 28

these companies are paying the major part of the reparations cost and not Roumania. The only way to correct such a situation was to require Roumania to pay a fair price for the oil and such a plan was voted as an amendment to the commission's recommendations. While this, if finally approved, is not the whole solution, it will be a necessary and urgent improvement to the situation.

Still Not Settled

Unfortunately, after all, the Paris Conference itself did not settle any of these problems. It merely has recommended these solutions to the Council of Foreign Ministers now about to meet in New York. Assuming that these conference proposals are actually approved by the ministers, they still must be ratified by the various countries, such as the Senate in the case of the United States. There is no evidence that Russian will agree to solutions affecting oil on which she was outvoted in Paris. The last days of the Conference are well known to all, the entire Yugoslav delegation absenting itself on the last day's session to show its disagreement on many issues.

Tail That Wags Dog

The next few months will be critical indeed to Anglo-American, Dutch, French, and Belgian oil interests in Europe. The disposition of the oil situation can well be the tail that wags the dog, in settling the peace of Europe.

Velazquez Well Waiting Equipment Before Tests

The question of possible oil production from Texas Petroleum Company's Velazquez 1 in the Magdalena Valley Department of Boyaca, Colombia, is still in the balance with the well having been shut down for further equipment before completing tests. Casing was landed at 8265 feet (bottom of the hole 8455 feet), and the first test in open hole below the pipe, resulted in recovery of salt water with traces of oil. This was of no importance as a test since nothing was expected of the lower, conglomerate section immediately overlying the basement granite in which the well is bottomed.

Another test has been made just above the casing seat, and just below 8000 feet, as a matter of routine. Further tests are scheduled in the sections which showed the most promise on the basis of coring and preliminary tests. Best section was between 6700 feet and about 7900 feet where several sands were cored, one of which showed 15 stands of oil on a drill stem test.

Arsenal Turns Out Oil Tools

Report From London

By
E. N. TIRATSOO,
Staff Writer for
The Oil Weekly

BRITISH press reports that Anglo-American Oil Company had discovered oil at a depth of 4920 feet in a wildcat test being drilled at Gringley-on-the-Hill, near Doncaster, Nottinghamshire, England, have been denied by the company.

The Gringley[1] has been drilling for several months at a location made after a seismograph survey revealed a subsurface uplift in the Carboniferous Limestone. The surface structure is a prominent hill, on the crest of which the test is located.

This test has provided a great deal of valuable stratigraphic information, in particular with reference to the coal seams of the area.

The local stratigraphy is as follows:

Triassic	Keuper sandstones Bunter aquiferous sandstones
Permian	Shales and marls Magnesian limestone
Carboniferous	Coal Measures (coal seams and sandstones) Millstone Grit (sandstones and grits) Carboniferous Limestone

The most probable reservoir rock in this series is the Millstone Grit, which is likely to be found at depths greater than 5000 feet. It is the Rough Rock sandstone of the Millstone Grit that has produced oil in the British fields of Eakring, Kelham Hills, Dukes Wood and Nocton.

In 1945, a 5459 foot hole was drilled at Belton, about 12 miles north of Gringley, on a buried structure detected by seismograph. Traces of oil were found in a fine-grained sandstone of the lower Coal Measures, but although the well was deepened into the Carboniferous Limestone, the strata which had proved petroliferous at Eakring were not found. The Gringley well should reveal whether this was a local phenomenon or whether the petroliferous Millstone Grit sands are absent in this part of Nottinghamshire.

New Zealand Firm

A new company is to be formed in New Zealand for importing and distributing petroleum and petroleum products with 51 per cent of the stock to be held by the New Zealand government, and 49 per cent by Anglo-Iranian Oil Company. Anglo-Iranian will supply the company with oil at favorable prices, not exceeding the price of Persian gulf oil plus shipping costs. Total capital is expected to be about $8 million, of which $3,865,000 will be issued.

Crude Production

(Total for Month of September)

COMPANY	Barrels
Anglo-Ecuadorian	123,781
Anglo-Egyptian	672,046
Apex (Trinidad)	277,784
Kern (Trinidad)	41,768
Lobitos (Peru)	168,399
Trinidad Leaseholds	543,436
Venezuelan Oil Concessions:	
Bolivar District	4,857,212
Maracaibo District	1,644,154
Trinidad Petroleum Developmen's	234,507
Attock Oil (Punjab)	*77,814

* Three month Period Ending September 30.

Petrochemical Plant

A new company called Petrocarbon Ltd. has been formed in England to exploit Dr. Weizmann's "Catarole" process for producing the full range of aromatic hydrocarbons from an essentially non-aromatic naphtha or gas oil stock. High olefine content will be recovered from the gas produced in the process. The "Catarole" process is essentially a high-temperature catalytic cracking process, and the aromatics obtained will be a valuable addition to the supply derived from coal-tar.

A new plant is to be built at Partington, near Manchester, which will handle an initial throughput of 350,000 barrels of charging stock per annum and will later be expanded to process 700,000 barrels per annum.

Tool Manufacture

The British Ministry of Supply now are turning out heavy oilfield equipment at the Woolwich Arsenal. This is part of the program to utilize the wartime ordnance factories to the fullest possible extent in peace activities. Drill collars, kellys, etc., are being produced at Woolwich under the supervision of British Oilfields Equipment Co., Ltd., which is acting on behalf of the government.

Phoenix Is Sold

It has been announced in London that Phoenix Oil Company has been transferred from the control of General Mining and Finance Corporation to Alpha Petrol Company. The latter organization is a subsidiary of the Alpha Group of South Africa, which has extensive mining and transport interests.

Phoenix Oil Company operated in Roumania under the title "Unirea." Before the war its Roumanian production was about 7 million barrels a year, but present production is less than 2,450,000 barrels. The great majority of the oil produced in Roumania is exported as war reparations to Russia, the company receiving only about one-third of the market value.

Representations were made at the Paris Peace Conference to remedy this and it is hoped that eventually 50 per cent of the Unirea oil will be permitted to be exported to countries in the sterling area, while the Roumanian government will pay a more equable price for the reparations oil.

Coevorden Field Registers Sharp Production Increase

The Brussels newspaper De Nieuwe Standard recently stated that production in the Coevorden field, Holland, had reached a daily output of 1415 tons (about 9900 barrels) from 15 wells and that the field now covers about 1900 acres. This is a sharp increase from the June production which was reported at 200 tons (about 1400 barrels) daily.

Production at the present rate, if maintained, would give the field an annual output of one-half million tons (about 3½ million barrels) and thus would supply about one-third of Holland's requirements of petroleum products totaling some 1,700,000 to 1,800,000 tons (about 11,900,000 barrels).

Funds for Drilling

The Stalin Synthetic Petrol Works at Most (Brux) in Northern Bohemia has given the Czechoslovak Minister of Industry about $500,000 for oil drilling in Southern Moravia, Prague radio has announced.

Italy REHABILITATING Her Oil Fields

By ANTONIO GIORDANO, Milan

THE Italian oil market is at the eve of important developments both with reference to the question of the rehabilitation of the Italian oil resources as well as the problem of reconstruction of the country's refining plants.

Considerable interest currently is being manifested in the search for oil in northern Italy. It was recently announced that an agreement was pending between the Azienda Generale Italiana Petroli (AGIP) and Standard Oil Company (New Jersey) regarding exploitation of the oil fields in the Lodi-Piacenza-Parma districts, the Pietramala region (Florence), and the Ripi district (Rome).

In addition to this prospective development, it has been announced that the Italian government has granted a concession for oil research to MacMillan Petroleum Corporation of New York covering 13,000 hectares (about 32,123 acres) in Sicily located in the districts of Licata, Cattolica, Taclea, Ribera, Comitini and Joppolo Giantascio.

Tests in Prospect

Meantime, representatives of British oil interests working in the Levant have recently visited Italy and have negotiated an oil concession in the Etna territory while Royal Dutch-Shell is reported to be considering the possibility of carrying out oil prospecting work in the zones of Basilicata, Campania and in the provinces of Rome and Frosinone. Reports say that in such oil exploring by these interests, gravimetric devices are to be used, and should the prospecting be successful tests will be drilled to 3000 meters (about 9840 feet).

In order to avoid the possibility of political opposition by the left Italian parties, the work is to be carried out in the name of Italian subsidiaries to be created by all the above referred interests.

The increasing importance of oil and petroleum products in Italian economics can be seen from the fact that, in consequence of the shortage of coal supplies, Italian State Railways are using oil-burning locomotives and Italian industries are using oil-burning steam plants to an increasing extent.

While oil fields in Northern Italy came out of the war practically undamaged, oil fields in Central Italy (Pietramala and Ripi) were destroyed by the German forces during their withdrawal from the south to the north.

The Societa Petroli d'Italia began immediately after the war the reconstruction of the Piacenza-Parma fields with the result that at present the area has reached an output of about 1500 tons (11,478 barrels) monthly.

The Societa Idrocarburi Nazionali of Florence has started reconstruction work in the Pietramala field (Florence) and present output is estimated at about 1000 tons (7652 barrels) annually.

However, because of the difficult financial situation of AGIP, conditions remain unaltered in the Lodi and Ripi oil fields. The pending AGIP-Standard agreement probably will lead to development of these areas.

In connection with the Lodi oil fields it should be noted that during 1939-40 some American geophysical experts came to Italy to train the AGIP personnel in the use of reflection seismograph apparatus. These instruments were first employed at San Colombano and Casalpusterlengo in the Lodi district followed by the drilling of some unsuccessful tests. However, the AGIP experts suggested a deep test up to 3000 meters (9840 feet) south of Lodi but the Ministerial Committee for the Supervision of Oil Researches refused to take into consideration such proposal and ordered a deep test in the Podenzano district.

The Lodi region remained thus inactive until the end of 1942 when the Chairman of AGIP charged Ing. Carminiani, an Italian oil expert who resided a number of years in California, to take up the question of the Lodi prospect, and as a result of his investigations submitted to the AGIP two reports regarding the Lodi oil fields. In his first report Carminiani stated that before condemning the Lodi structure as non-productive at least 6 tests should be drilled in approximately studied sites. As a matter of fact, it was in May, 1944, when the unexpected results of wells 4 and 6 at San Giorgio Piacentino proved the foundation of the estimates made by Carminiani, that the AGIP commissioner authorized drilling in the territory of the town of Lodi itself. A test to 1342 meters (4400 feet) found gas accumulation and at 2780 meters (9100 feet) picked up an oil sand estimated to have an extension sufficient to insure an output covering a large share of the Italian oil consumption.

With the development of the war in Northern Italy such research work was neglected and only in the course of the past few months the question has again been raised through the pending AGIP-Standard (New Jersey) agreement.

AGIP began the reconstruction of the Ripi field immediately after the liberation of Rome and reports indicate that the production has been brought to 200 tons (1530 barrels) monthly.

Gas Resources

During the Fascisti regime the Rome government created the Ente Nazionale Metano (Methane Gas State Organization) which entrusted the exploitation of the gas resources to private concerns which would pay to the government 50 percent of their earnings in return for the concession. This fact has prevented a rational exploitation of the Italian natural gas resources as it was pointed out in the report for 1945 of the Societa Idrocarburi Nazionali of Florence, operating the Pietramala gas district, production reached about 6 million cubic meters (212 million cubic feet) of gas. The Pietramala district is connected with a gas pipe line, destroyed during the war but immediately rebuilt, to the town of Florence where methane is used for heating purposes. There is a proj-

ect pending to connect the Pietramala district with the town of Rome where the methane gas will be distributed both for heating and for urban transport purposes.

Reorganization Considered

In Northern Italy (Piedmont, Lombardy, Emilia and Venitia) the methane gas output during 1945 reached about 4 million cubic meters (161 million cubic feet) against 2.9 million cubic meters (103 million cubic feet) during 1944. This shows the rehabilitation of natural gas resources but there is no doubt that the gas problem is still unsettled when you consider that, according to the opinion of Italian engineers the Padova-Rovigo-Ferrara district alone could give a yearly output of 10 million cubic meters (353 million cubic feet) of gas. The present regime of concessions through the Ente Nazionale Metano is opposed by private industrialists, and even the government has realized the justice of the complaints as it has taken up the question of reorganizing the Ente. However, no conclusion has been reached.

It has been announced that the Italian electric companies have been studying the possibility of employing methane as a substitute for coal in their steam electric plants. Should this proposal materialize it could mark the beginning of new era in the exploitation of the Italian natural gas resources.

Refining Industry

The Italian government is considering the possibility of granting currency facilities to favor oil purchases abroad and the lifting of the fiscal restrictions on the imports of such oil. During November the Naples oil refinery where 20,000 tons (153,000 barrels) of crude oil are to be treated monthly, will be placed in operation, and studies are being carried out to develop fluid catalytic cracking at the plant.

It is reported that the Standard Oil Company has purchased 40 percent of the shares of Azienda Nazionale Idrogenazione Combustibili in which the Italian government and Montecatini Chemical Products company are both interested. The concern, known as ANIC owns the Bari and the Leghorn hydrogenation plants, the first of which came out of the war undamaged, while the second one requires extensive repairs. The Bari plant is scheduled soon to start working 25,000 tons (191,300 barrels) of crude oil monthly, employing the hydrogenation process, while repair work is to be started at Leghorn with materials supplied by the Standard Oil Company. It is reported that most likely the hydrogenation units will be repaired and fluid catalytic cracking units installed so as to insure the output of quality products.

Italian industrialists have asked the government to alter the mining law so there will be no limitation on the extent of the concessions that may be granted. Although the present law does not actually limit the extent of oil research concessions, it has been the practice of the government not to grant single concessions of more than 2000 hectares (about 5000 acres).

Guarantee of a concession option to companies doing geophysical work also is urged. This option is not set out in the present law and has tended to retard exploitation of deep producing possibilities.

Meantime, the distribution of methane gas in Italy is being expanded. By the end of October methane was slated for household heating in Ferrara where one of the largest pressure stations in Italy is under construction. Methane gas pipe lines in service in Italy now total about 500 kilometers (about 310 miles).

Pipe Line Plans

Methane gas producers are planning to connect the North Italian methane pipe line systems, ending at Ferrara and Reggio Emilia, with Bologna, thus establishing a direct connection with the Consandolo pipe line. Another project would connect the North Italian lines with the Bari oil hydrogenation plant of Azienda Nazionale Idrogenazione Combustibili. These projects may be retarded as the Italian government has ordered the liquidation of state control over methane gas and its exploitation.

New Producing Area Said in Prospect For Magdalena River Valley, Colombia

A new producing area seems in prospect for the Middle Magdalena Valley area of Colombia, although much more development will be necessary before the actual commercial possibilities can be determined. Socony-Vacuum Oil Company of Colombia's La Salina 1, on the Las Monas concession north of Tropical Oil Company's De Mares property, has been brought in from shallow sands as a flowing well, but of relatively small potential.

Initial production, flowing through open tubing, is 70 barrels daily, and the drilling rig has been moved off, but preparations are under way to install pumping equipment in an effort to determine full potential. Drilled to 4378 feet, casing had been set just below 3300 feet after drilling through the upper sand bodies, and completion was made with three perforated sections open. Intervals perforated were at 1370-1490 feet, 1750-1840 feet, and 2130-2230 feet, leaving a total of 310 feet of section open for completion. Meanwhile operators are setting up rig for the second test located north of the discovery.

Has 20-Year History

Actually this is not a new area, since it had been drilled by South American Gulf Oil Corporation as much as 20 years ago when it completed its first well as a producer making 120 barrels daily from 904 feet, but later wells were disappointing, and the property was transferred to Socony Vacuum when the Gulf Company sold the Barco Concession interests to Socony and The Texas Company in 1936. Socony-Vacuum then drilled some shallow tests, but was delayed by the war from further development. The original Gulf well is still capable of producing approximately 100 barrels daily.

Pedral 1 Abandoned

A failure was registered by the Socony-Vacuum recently with abandonment of its Pedral 1, west of the above area. Drilled to 9310 feet, it was delayed several months by a bad fishing job and then sidetracked to redrill a sand around 7700 feet, and although it showed some oil it would not produce.

YPF Given Funds to Buy Oil Production Equipment

The Argentine government has issued a decree under which the Finance Minister has been instructed to open a special credit account for the sum of $12 million in favor of the Yacimientos Petroliferos Fiscales (Government Oil Fields), according to a report from Buenos Aires. The amount is to be used for the purchase of drilling machinery and other equipment.

Eastern Peru Active; Domestic Demand Increases

Increased geological activity in the Montana jungle area of eastern Peru has been reported by the Department of Commerce.

Compania de Petroleo Ganso Azul is drilling its first well since 1941 at Agua Caliente. This is the first well of three planned for the year.

Domestic consumption of petroleum products in Peru also was reported to be increasing and is now more than 50 percent higher than in 1940.

Reconnaissance Surveys to Start Soon On Saudi Arabia-Mediterranean Line

Trans-Arabian Pipe Line Company expects late this year to start reconnaissance surveys for the proposed pipe line from the Saudi Arabian oil fields, on the Persian Gulf, to Mediterranean ports.

Meanwhile negotiations are still under way to obtain right-of-way agreements with all countries to be traversed by the line. Some of these have been completed but others, including Syria, are still pending.

Last week it was reported that the company had not yet made final decision as to just where the line would terminate, there being three different points under consideration. A number of factors, including but not limited to political situations, will influence the company in making its decision. Generally the first portion of the route has been decided upon, as well as the general minimum specifications for the line.

Slightly more than 1000 miles in length, it will be designed for a capacity of 300,000 barrels daily, approximately the capacity of the Big Inch line from Texas to the Atlantic Seaboard. Originally planned as a 26-inch line, it is entirely possible that it will be even larger, and have greater capacity. However, pending further development of the properties it is to serve, its present proposed capacity should be sufficient for the time being, since Saudi Arabian fields are currently producing 185,000 barrels daily in addition to the 20,000 barrels produced from Bahrein Island. Present tanker availability is sufficient to handle this output.

Trans-Arabian Pipe Line Company is jointly owned by Standard Oil Company of California and The Texas Company, who are also joint owners of Arabian-American Oil Company and Bahrein Petroleum Company, Limited.

Regie Autonome Has Seven Rigs Busy in South France

Seven rigs are active on Regie Autonome des Petroles concession in southern France, (See *World Oil Atlas*, Page 175) Jean de Vries, director of the company, said recently on his visit to Houston.

One of the tests are located on the St. Marcet structure; four are east extension tests to the St. Marcet field, and two are north outposts. Oil and gas are found in the St. Marcet field between 5000 and 6000 feet. So far, the deepest test drilled in the area reached 11,000 feet.

At the present time, the field is producing about 10 million cubic feet of gas daily from six wells. This output will be increased with the completion of four new pipe lines and an absorption plant. The plant will have a capacity of 42 million cubic feet daily and construction of all projects are slated to be completed by the end of 1947, De Vries said.

Russia Opens Line

The 300-mile pipe line linking the Saratov gas fields with Moscow was scheduled to begin operating at full capacity during October, the Moscow radio recently announced.

Kuwait Oil Celebration

The Sheikh of Kuwait, His Highness Sir Ahmed at Jabir al-Subsh, was recently presented a fast day cruiser to celebrate the first shipment of oil from Kuwait.

The presentation was made by the Kuwait Oil Company as a gesture of Anglo-American and Arabic friendship. The cruiser was launched by C. A. P. Southwell, managing director of the company, and A. W. Schofield, assistant managing director.

Located In Italy

Edward C. Borrego, petroleum attache to the U. S. Embassy, Rome, from September, 1945, until September, 1946, has been appointed general manager of Societa Petrolifera Italiana, Italian producing subsidiary of Standard Oil Company (New Jersey). Borrego, a graduate of the Colorado School of Mines, was field superintendent for Standard of New Jersey in Mexico, later became field superintendent of Creole Petroleum Corporation in Venezuela and afterward was with The Carter Oil Company in Illinois and Oklahoma. During the war he served as a major in the U. S. Army in the Italian campaign.

Edward C. Borrego

Interest Is Shown in 1947 South American Congress

The cordiality with which all the countries of North and South America have received the invitations to attend the First South American Petroleum Congress assures the success of the meeting scheduled in Lima, Peru, the first week in March, 1947.

Representatives of the petroleum industry of the Americas will convene at Lima to consider industry problems, especially problems confronting South America.

Letters have been received by the Instituto Sudamericano del Petroleo from many countries, including the United States, Peru and Mexico, expressing interest in the meeting. Among those in the U. S. expected to send delegates to the Congress are the War Department, Navy Department, American Petroleum Institute, American Association of Petroleum Geologists, U. S. Bureau of Mines, and Columbia University.

Mexico's Fields Register Increase, August Over July

Mexico's three northern fields produced a total of 3,809,714 barrels during August, a slight increase over the July output of 3,748,092 barrels, the Department of Commerce has reported.

The production was divided as follows: Poza Rica, 2,281,923 barrels; Naranjos, 676,359 barrels, and Panuco, 851,432 barrels.

Total stocks on August 31 were 880,095 barrels in the Poza Rica field; 488,083 barrels at Naranjos, and 1,065,619 barrels at Panuco. The stocks totaled 2,433,787 barrels as against 2,585,376 barrels on July 31.

Southern Rhodesia Plans

British Africa Rotary Drilling (Rhodesia) Ltd., with headquarters at Salisburg, Southern Rhodesia, was recently organized to drill for oil and water in the South Africa country.

J. H. Barber, formerly employed in oil fields of Ecuador, is drilling superintendent and says the new company is interested in purchasing drilling equipment in the United States.

Barber points out that although Rhodesia is in the sterling bloc there is no apparent difficulty in obtaining the necessary release of dollars for the purchase of essential equipment direct from the United States as drilling for both oil and water in the country carries a priority.

Navy Department Keeps Lid of Secrecy Tightly Clamped on Alaskan Operation

Clamping on a lid of secrecy, the Navy Department this week refused to disclose whether its initial well at Umiat Mountain in Naval Petroleum Reserve No. 4 was completed this summer as projected and declined to reveal any information regarding the progress of its $11.7 million program to test the possibilities of its Alaskan fields.

Commodore W. G. Greenman, director of naval petroleum reserves, has just returned from an inspection trip to the reserve and has submitted a report on the progress of the work to Secretary James Forrestal. Department officials, however, said the whole matter is "restricted," and no information would be made public at this time.

The Navy project, now scheduled to be wound up in 1950, contemplates thorough exploration of the reserve and, if large quantities of oil are found, sufficient development and operation to meet security requirements, all under civilian contracts.

Working Setup

The program was laid down and is being carried out with the firm of DeGolyer and MacNaughton acting as special advisers, and the exploratory wells are being drilled by the firms of Hoover, Curtice and Ruby and Lytle and Green as a joint venture. Reconnaissance field work is being done by the U. S. Geological Survey in collaboration with the Navy and the photographic section of the Army.

The initial well at Umiat Mountain was drilled to 1860 feet when operations were halted by the weather last fall, and was scheduled to be completed to 6000 feet this summer. The earlier drilling developed five separate oil shows, none of which proved to be of commercial value but demonstrating that the well was in an oil-bearing area.

In addition to the Umiat Mountain well, the program for this year contemplated the starting of a second well provided the geophysical work indicated a structure favorable to the accumulation of oil.

The work started on the eastern third of the reserve, but was to be extended this year to the other sections, where geological and geophysical investigations already have been made.

The department is hopeful of finding a reserve of at least 500 million barrels, which would justify a production of 100,000 barrels daily. A preliminary pipe line survey has been made in anticipation of the possibility of production, and the viscosity of the oil is so low that its transportation during the Arctic winter offers no problem.

The total investment required for 100,000 barrels daily production would run between $50 and $95 million, according to Navy estimates, of which $2.5 to $5 million would be for geological and preliminary work, $10 to $40 million for the drilling of the original 400 wells, $13 to $17 million for a pipe line road, $23.5 to $30 million for the pipe line, and $1 to $3 million for the marine terminal.

It is estimated that the oil could be transported by pipe line from the field to tidewater at a cost of from 23 to 33 cents a barrel and could be delivered from Alaskan warm water ports to the San Francisco refinery area by tanker at a cost of 15 to 21 cents a barrel.

Development and operation of the field would be handled by private interests under contract, but it is not proposed to go into that phase of the matter until the presently-planned exploratory work demonstrates the potentialities of the reserve.

The Navy Department, however, has not finally decided upon the course to be followed if oil is found in the quantities hoped for, and in any event will discuss the whole matter with Congress.

One plan is to throw the reserve open and invite the industry or a combination of companies to bid on development of the field on an economy basis, the Navy reserving certain specified pools or quantities of oil. Another proposal is to have the government build a pipe line and either develop the field itself or have it done by private contract, moving the oil down to San Francisco for refining and then trading it for reserves already proven in the continental United States.

If the government undertook to provide the facilities to move the oil out, it is possible that the industry would be invited to go in and drill the additional wells either in or adjacent to the reserve which would give them a certain percentage of the estimated oil continent sufficient to pay them ultimately for the venture and would be required to pay for the use of the government pipe line until the cost had been amortized.

The Alaskan program was undertaken as a result of studies which indicated that future wars will require even greater amounts of petroleum than did World War II, that production in California would decline within a few years to a point insufficient to meet civilian needs, much less those of the Navy in wartime, and that a greater cost would be involved in developing a synthetics industry with a productive capacity equal to that necessary to make Alaska economically justifiable.

Quiriquire Field in East Venezuela Reported Taking on Added Importance

Quiriquire field, in the state of Monagas, eastern Venezuela, and the first producing field in the eastern part of the country, has been given added importance as a result of semi-exploratory work within the limits of the field itself and on the flanks. Creole Petroleum Corporation recently found additional production within the Quiriquire formation itself, a thick section of Pliocene beds and completions in the new area show reservoir characteristics similar to those found in the field's early stages. Reserves have been increased materially.

In addition to the new production in the regular pay horizon, several recent wells have been completed in the Eocene sand, a formation which does not produce at any other point in the eastern sector except for a small amount in one of the fields in the San Joaquin group on the extreme western edge of Eastern Venezuela. So far the drilling has not defined the new pay sufficiently for it to be evaluated, or compared with the old Pliocene production.

Since discovery in 1928, Quiriquire has produced almost 250 million barrels of oil, and although only 25 of its 240 wells are now flowing, it is currently producing at the rate of 50,000 barrels daily. Of the current daily production, 35,000 barrels is processed in the company's refinery at Caripito and the remaining 15,000 barrels is shipped from Caripito by tanker. Three drilling rigs are currently active in the field.

THE OUTLOOK

Administration officials are giving consideration to recommendations that the wartime export controls be made permanent as regards certain commodities basically important in the waging of war. They have in mind specifically, among other products, tetraethyl lead, which they foresee might be imported by a foreign nation and stockpiled against possible military needs.

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Organized labor will conduct a campaign of intimidation during the next two years to deter Congress from enacting anti-labor legislation. The campaign was opened by Robert J. Watt, international representative of the AFL, with a blunt warning that if Congress is "stampeded" into adopting such legislation "the victory in 1946 may boomerang in 1948."

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Retention by Japan of her petroleum industry, recommended by Reparations Commissioner Edwin W. Pauley, is not expected to make that country free of dependence on foreign oil. Before the war, Japan imported about 20 million barrels of crude and products annually, while developing production in mainland territory which she now has lost. Present production is running at the rate of about 1,635,000 barrels a year and imports are currently running about 210,000 barrels a month, all lubricating and fuel oil.

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Republican demands for sharp cut-backs in government activities and party opposition to federal regulation of industry may serve to limit rigidly the activities of the Oil and Gas Division in the field of correlation and centralization of oil activities. Aside from the administration of existing laws it is probable the new Congress will look with disfavor on any oil operations other than in the research field, and even here the Bureau of Mines may lose a substantial portion of the funds it will request.

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The Federal Power Commission may look for Congressional support for its rulings authorizing the construction of new or expanded natural gas distribution facilities which might bring home to John L. Lewis that he is pricing his miners out of their jobs. That part of the public which is not sold on labor-control of industry—and that includes many union members—also would support any Washington decisions which would insure them of a constant fuel supply.

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A coal strike would shut down the country's steel mills and the oil field equipment and supply business, already running six months behind on orders, would reach a truly critical state. Tubular goods and structural shapes are particularly scarce.

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A program to obtain an increase in salaries for Texas school teachers is expected to gain active support from Texas oil operators. The need for additional funds for school teachers has already been recognized by one state-wide oil association.

* * * *

The prolonged strike of cement workers in Texas is creating a serious shortage of this product for cementing wells, especially in the Permian Basin where so many long strings are being set every day. One large company's policy is not to start any well until adequate cement is on hand or definitely in sight.

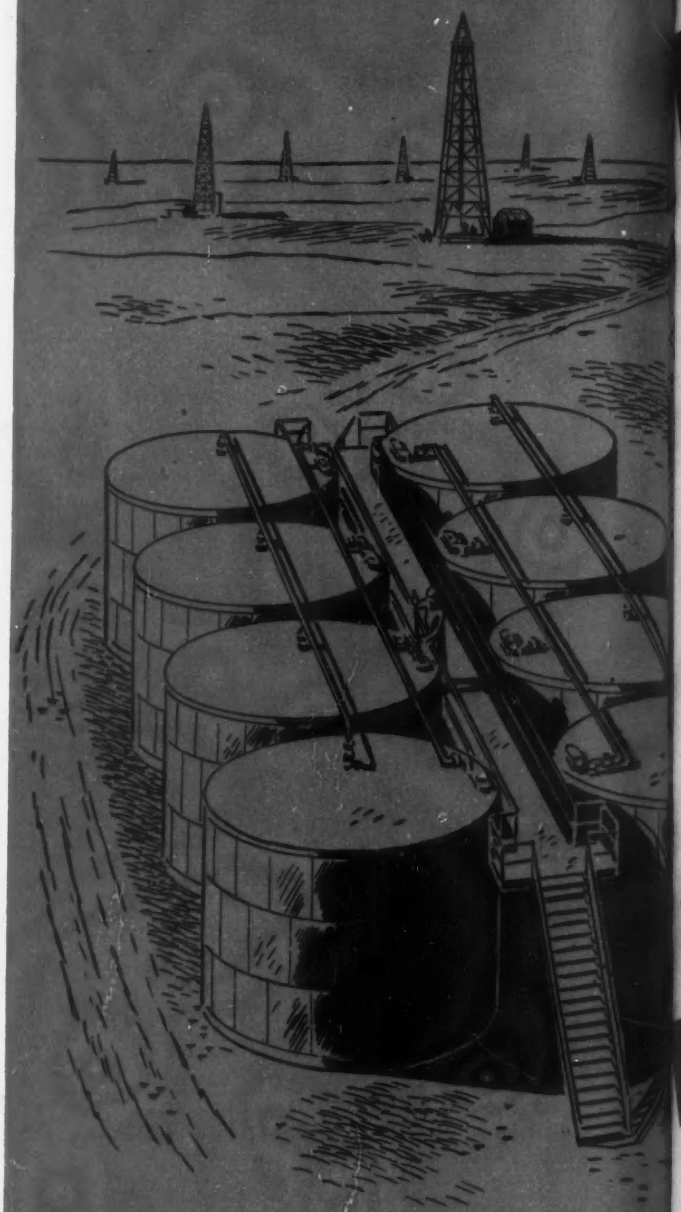
* * * *

Suitability of desirable diesel fuels as raw stocks for augmented high-octane gasoline threatens to stifle dieselization of many industries unless present and future diesel design can be revised to utilize heavier oils. Development of a market which can outbid the power-production industry for diesel fuel leaves unaffected only pipe lines among present large users of diesel engines, stations in most instances drawing fuel from the line throughput.

DOWELL

EXPERT WELL SERVICE WHEN AND WHERE YOU WANT

The real measure of Selective Acidizing is in the stock tanks



The true gauge of the effectiveness of selective acidizing is the increased oil produced into the stock tanks.

Selective acidizing increases permeability of the tighter sections and allows more complete drainage of the reservoir.

Selective acidizing of new wells or workovers with the Dowell Electric Pilot permits the introduction of the acid into the desired part of the pay zone. This enables Dowell engineers to make treatments resulting in maximum production increases.

Backed by full laboratory and research facilities of The Dow Chemical Company, Dowell pioneered and developed selective acidizing. For the same service, the same knowledge, experience and equipment which have increased production in hundreds of wells—call your nearest Dowell station.

Other Dowell Service and Products: Mud Acid Service—Plastic Service—Water Locating Service—Industrial Scale Removal Service—Jelflake and Jelfoam, Paraffin Solvents and Inhibited Hydrochloric Acid.

DOWELL INCORPORATED • TULSA 3, OKLAHOMA
Subsidiary of The Dow Chemical Company

EXAMPLE: Well No. 8642

Drilled 1938. Initial potential—58 barrels per day after acidizing. Production finally dropped to 3 barrels oil and ½ barrel water per day. Permeability survey followed by Selective Acidizing with Electric Pilot restored production to 40 barrels per day.

Look to

DOWELL

FOR OIL INDUSTRY CHEMICAL SERVICE

Baash-Ross News

BAASH-ROSS TOOL COMPANY · LOS ANGELES · HOUSTON · NEW YORK

OUR 26th YEAR

NOW 2 types OF BAASH-ROSS SAFETY CLAMPS!

1. BAASH-ROSS TUBING SAFETY CLAMP (TYPE "T")

A new size Safety Clamp for taking a firm non-slip grip on Tubing and other small diameter pipe from 1 5/16" O. D. to 4½" O. D. inclusive.

2. BAASH-ROSS STANDARD SAFETY CLAMP (TYPE "C")

The well-known standard size Safety Clamp for taking a firm non-slip grip on pipe, drill collars, liners, etc. with O. D's from 3¾" to 13⅜" O. D. inclusive.

BOTH types have these same unique advantages...

QUICKLY APPLIED: To apply either the Tubing or Standard Safety Clamp, simply wrap the flexibly-linked unit around the pipe, insert a pin and cinch tight with the quick-acting wrench. That's all you do to safeguard against dropping flush-jointed tubing, pipe, drill collars and similar equipment down the hole.

NON-SLIP GRIP: As the Clamp is tightened individual spring-loaded slips in each link take a firm initial grip on the pipe. Should the pipe start to drop these slips wedge tighter as the load increases, firmly locking the Clamp to the pipe so that it cannot slip.

WIDE OPERATING RANGE: By simply adding or removing links—a quick, easy operation—both the Tubing and Standard Safety Clamps can be readily adapted to gripping a wide range of diameters. For each link added or removed, a Clamp's range of diameters is increased or decreased one inch, respectively. The Tubing Safety Clamp handles pipe diameters from 1 5/16" O. D. to 4½" O. D. inclusive and the Standard Safety Clamp pipe diameters from 3¾" O. D. to 13⅜" O. D. inclusive.

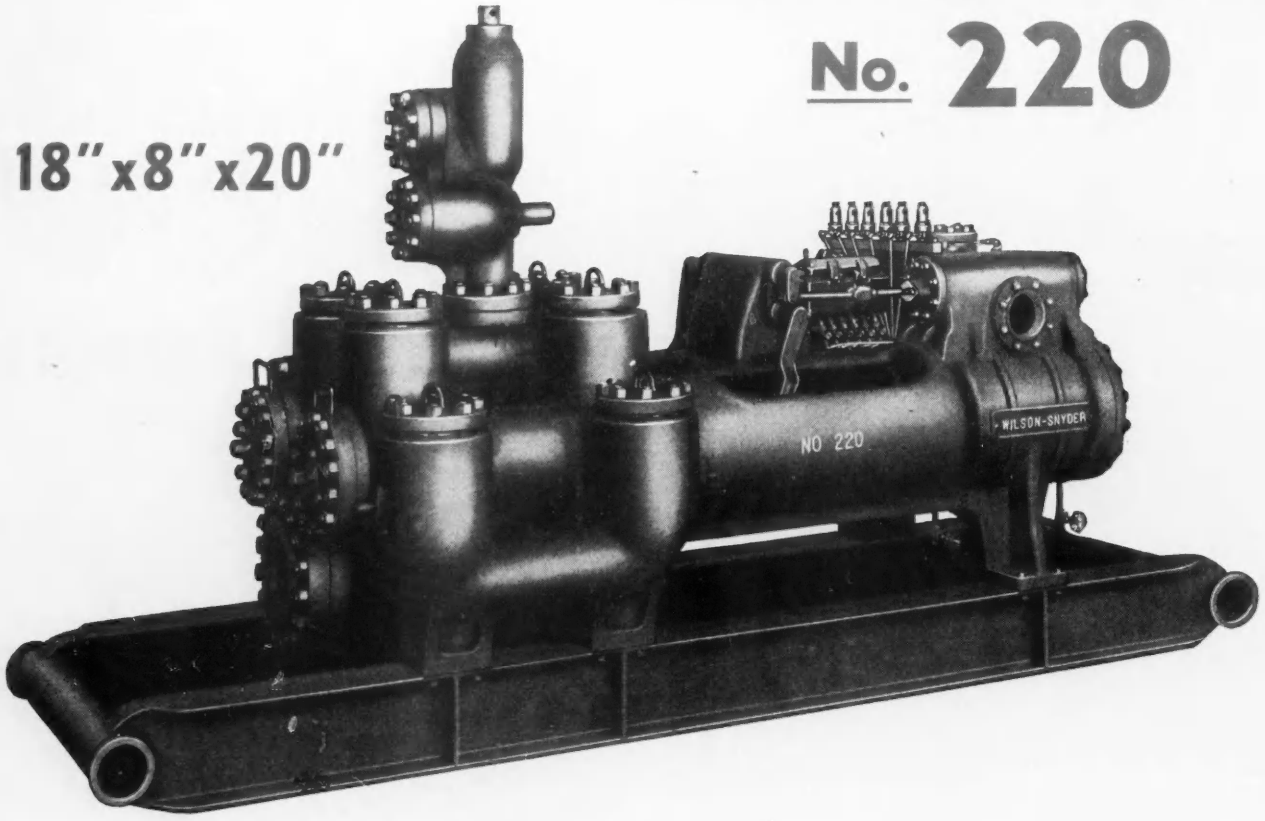
MANY VALUABLE APPLICATIONS:

There are so many time-saving, labor-saving and trouble-saving uses for the Tubing and Standard Safety Clamps that no rig should be without them. Besides safeguarding against dropping flush tubing, drill collars and other hard-to-handle equipment, use them (1) for providing emergency elevator shoulders when lifting "twist-offs," flush liners, gravel-packed liners, etc... (2) as a grip for pulling line pipe into position, or holding it aligned while welding joints... (3) to simplify the setting of casing and landing head equipment—and many other uses. Your nearby Baash-Ross representative will gladly give you the details... or write direct.

NOW A LARGER and MORE POWERFUL DUPLEX STEAM SLUSH PUMP

The WILSON-SNYDER No. 220

18"x8"x20"



This powerful pump received instantaneous acceptance for deep hole work. Field reports and repeat orders prove that this acceptance was justified.

Features contributing to its success are extra heavy fluid liner holding device with convenient external adjustment, Tell-tale Liner Packing, weather proof grease packed roller bearing steam valve mechanism, balanced piston type steam valves, and 6-feed locomotive type steam end lubricator.

BRIEF SPECIFICATIONS

Steam Cylinder Bore	inches	18
Fluid Cylinder Bore Maximum	inches	8
Stroke	inches	20
Rated Working Pressure:		
Discharge	p.s.i.	4,000
Suction	p.s.i.	3,000
Steam Working Pressure	p.s.i.	400
Stalling Pressure with 8" Piston 400 p.s.i. Steam Pressure	p.s.i.	2,030

Call or write Houston Headquarters or your nearest Wilson Store for additional information.

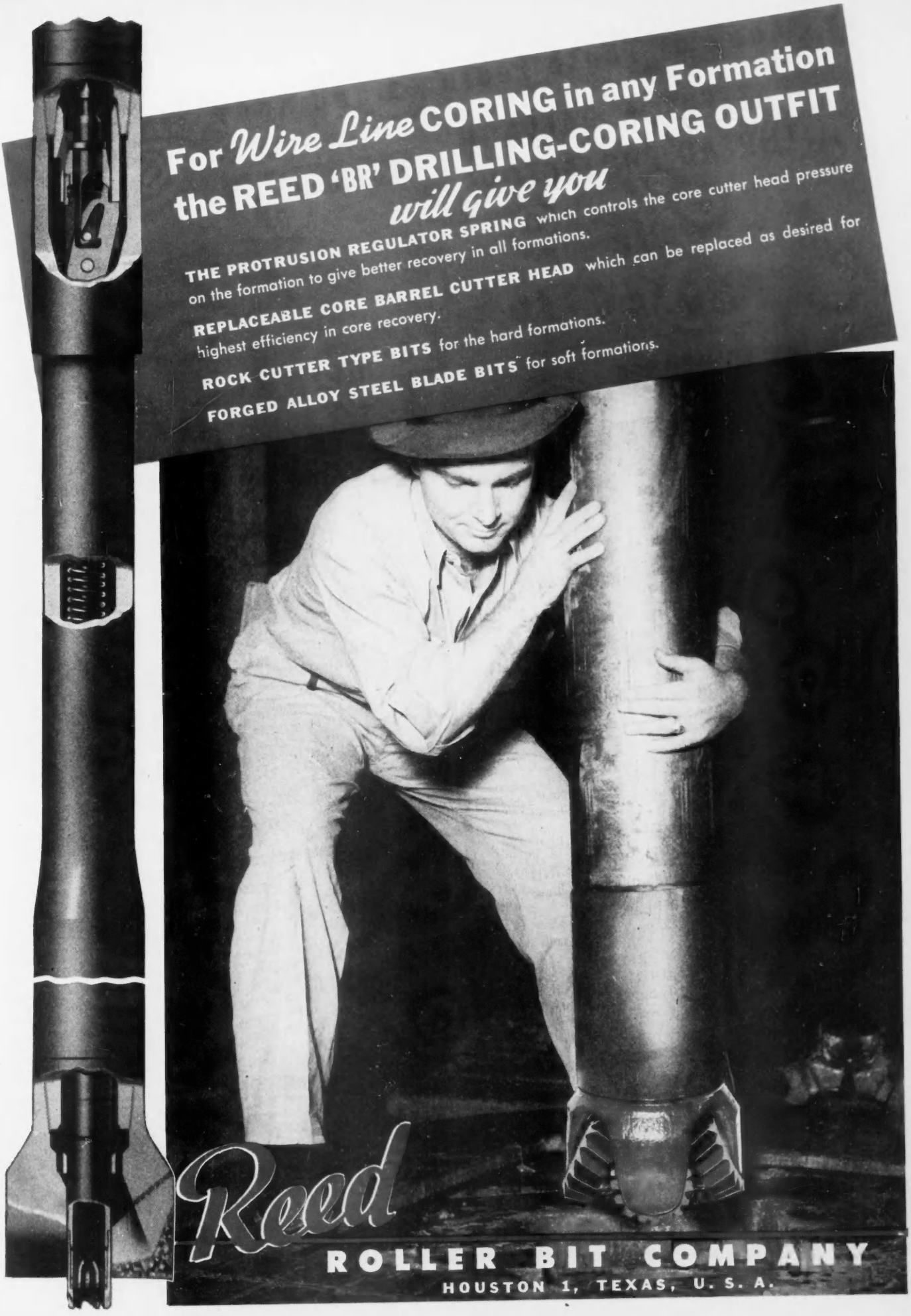
Exclusive Distributors: Texas, Louisiana, Gulf Coast

WILSON SUPPLY COMPANY

1412 MAURY ST., HOUSTON, TEXAS

SALES OFFICES: Tulsa, Oklahoma; Dallas and San Antonio, Texas. LOS ANGELES: Western Pressure Control, 5700 Santa Fe Ave. TRINIDAD, B.W.I.: Neal Massey Eng. Corp.

BRANCH STORES: TEXAS—Kilgore, Beaumont, Barbers Hill, Bay City, Monahans, Alice, Victoria, Corpus Christi, Columbus. LOUISIANA—Lake Charles, New Iberia, Harvey, Shreveport. ARKANSAS—Magnolia. MISSISSIPPI—Natchez.


For Wire Line CORING in any Formation
the REED 'BR' DRILLING-CORING OUTFIT
will give you
THE PROTRUSION REGULATOR SPRING which controls the core cutter head pressure on the formation to give better recovery in all formations.
REPLACEABLE CORE BARREL CUTTER HEAD which can be replaced as desired for highest efficiency in core recovery.
ROCK CUTTER TYPE BITS for the hard formations.
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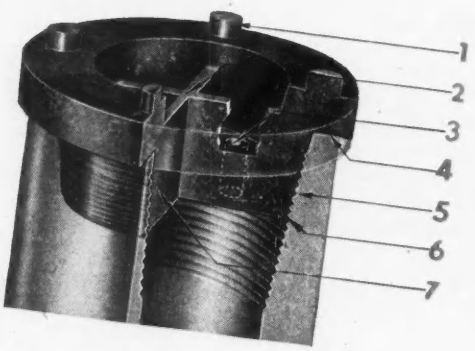
ROLLER BIT COMPANY
HOUSTON 1, TEXAS, U. S. A.

Look at These Features and Know Why

PATTERSON-BALLAGH THREAD PROTECTORS GIVE POSITIVE PROTECTION!

BOX END TYPE



1 MOLDED BOSSES FOR EASE OF HANDLING and reinforcement.

2 STRONG CROSS-BRACED INTERNAL RIB, for added strength, ease in making up.

3 FOUR DRAINAGE HOLES.

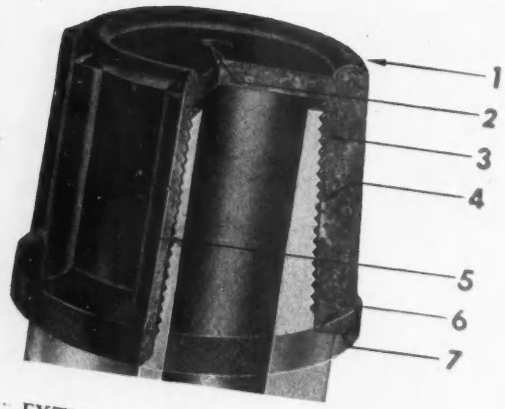
4 EXTRA THICK WIDE FLANGE SEATS FIRMLY to seal threads and for shock absorption.

5 MAKES UP FIRMLY ON STANDARD SIZES API THREADS, Regular or Full Hole, R.H. or L.H. Threads.

6 SUFFICIENT NUMBER OF THREADS TO SECURE FIRM, QUICK MAKE UP.

7 PBX SPECIAL FABRIC-REINFORCED RUBBER THROUGHOUT; water, oil, weather and abrasion resistant. Light weight, makes up and breaks out freely.

PIN END TYPE



1 EXTRA THICKNESS and CIRCULAR RIB protects pin end against damage.

2 DRAINAGE HOLE.

3 MAKES UP EASILY on Standard Sizes API Regular or Full Hole, R.H. or L.H. Threads.

4 AMPLE THREADS FOR TIGHT GRIP.

5 8 HEAVY VERTICAL REINFORCING RIBS for added strength and ease of handling.

6 WIDE SHOULDER FLANGE SEATS FIRMLY to absorb shock and seal threads.

7 PBX SPECIAL FABRIC REINFORCED RUBBER THROUGHOUT, water, oil, weather, and abrasion resistant. Light weight, makes up and breaks out freely.

PATTERSON-BALLAGH'S "BEST BET YET" for saving Tool Joints are the popular new Heavy Duty Thread Protectors. Made of tough PBX Special Rubber, they absorb shock and shield threads during handling. *They can be used over and over again.* They are made in a variety of sizes for both pin end and box end, and for R.H. and L.H. Threads. Use Patterson-Ballagh Heavy Duty Thread Protectors to prevent damage to Drill Pipe and all heavy items, such as Drill Collars, Kelly Subs, Fishing Tools, Reamers, Swivels and Bits.

Specify **PATTERSON-BALLAGH**

A DIVISION OF BYRON JACKSON CO.

"Best Bet Yet"

For complete specifications see the New 1947 Catalog just off the press. Ask for your copy.

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NEW YORK 17 ★ **931 Russ Bldg.**
SAN FRANCISCO 4

MISSION PUMP PARTS BEST
for Economical Service!
SAYS TOOLPUSHER EARL McGILL
● When Earl McGill became a driller, in 1935, he made a careful study of equipment. He has used MISSION Slush Pump Pistons, Valves and Rods . . . and MISSION Slips . . . ever since.
"There's no comparison", he says. "This rig has drilled 10 wells with one set of piston rubbers, and on our last 11 wells we have only changed inserts on two valves. MISSION File-Hard Rods outlast any others I have tried. MISSION Slips contact the pipe better—take hold and let go faster—speed up drilling." See next page.
Mission SLUSH PUMP PARTS
...have a mission...to save you money!

THEY GIVE *2 to 10 times more Service*

THE world-wide preference for MISSION Slush Pump Parts is a direct result of the extra service they render. MISSION Piston Rubbers practically double the period of service, as compared with ordinary rubbers. MISSION Super-Surfaced Piston Rods last up to 4 times as long as file-hard rods under corrosive conditions, and twice as long under ordinary conditions. MISSION Self-Sealing Gland Packings tighten on the pressure stroke but run free on the return stroke. Thus they insure a tight seal, yet reduce wear on both piston and packing. MISSION "Compound 308" Valve Inserts last 3 to 10 times longer than ordinary inserts. And the file-hard bodies and replaceable seat bushings of MISSION Valves extend the life of the metal parts 200 to 500 per cent.

These are strong claims. They deserve your full investigation.

We also manufacture MISSION Rotary Slips, MISSION Valveless Swabs, and MISSION Plug Valves.

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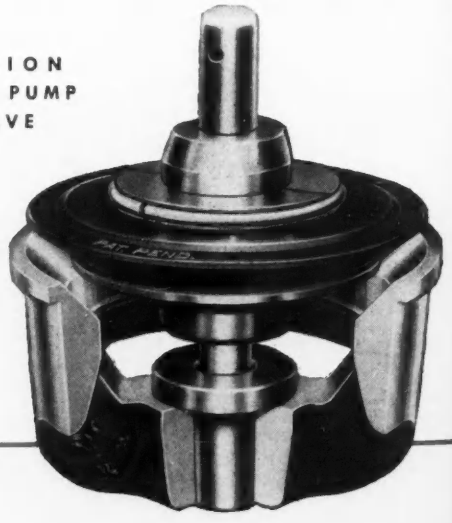
Export Office: Room 1636, 30 Rockefeller Plaza, New York 20, N. Y.

MISSION
SLUSH PUMP
VALVE



Mission SLUSH PUMP PARTS

. . . for More Efficient Slush Pump Performance

Thermoid Blankets the OIL FIELD!

Products Made To Take The "Slam-bang" Of Oil Field Operations

Make sure you get that *extra* service built into Thermoid Oil Field Products. Specialists in this field for many years, Thermoid Oil Field Products are engineered for dependability and economy.

These Booklets Available Without Obligation

POWERFLEX ROTARY HOSE

8-page booklet describing Rotary Hose and Flexible Discharge Units. Ask for Booklet No. 3009.

OIL FIELD BRAKE LININGS

24-page booklet giving technical data, specifications and prices on Friction Materials. Ask for Booklet No. 3001.

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"NO WIP" LINE SAVERS

4-page folder describing the advantages of these thoroughly engineered units, with installation data. Ask for folder No. 3007.

WIRE LINE TURN BACK ROLLS

4-page descriptive folder outlining advantages, with installation instructions. Ask for folder No. 3006.

DRILL PIPE AND TUBING PROTECTORS

4-page folder with complete data on "Pin Type" Drill Pipe and Tubing Protectors, giving sizes. Ask for folder No. 3008.

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SHEET PACKINGS • STUFFING BOX RINGS
PISTON SLEEVES • STABILIZERS

After January 1, 1947, all Thermoid-Grizzly Products will carry only the Thermoid name.

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TITLE_____
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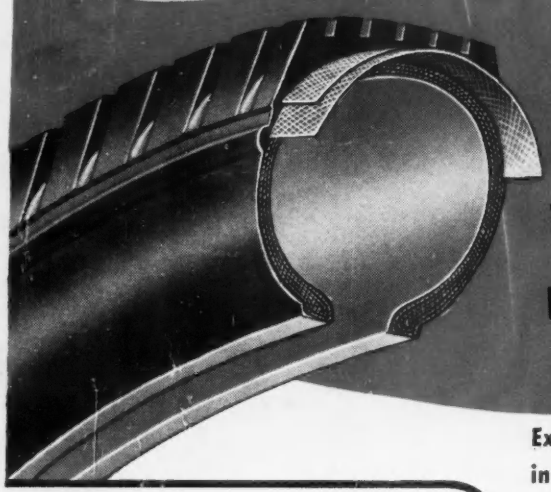
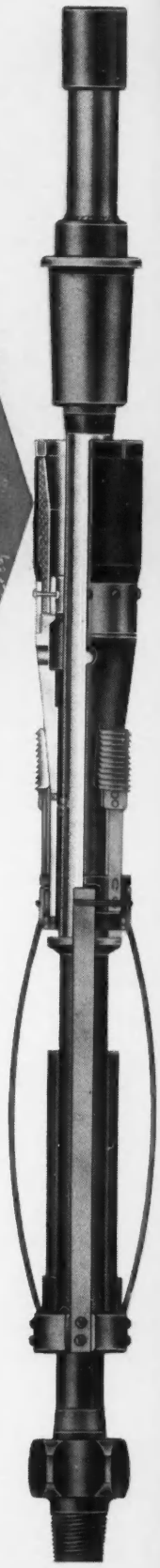
Fabricated LIKE THE TIRE on your car!



THAT'S WHY THIS "AMERICAN" PACKING ELEMENT RETURNS TO ITS ORIGINAL SHAPE WHEN THE CONE IS REMOVED!

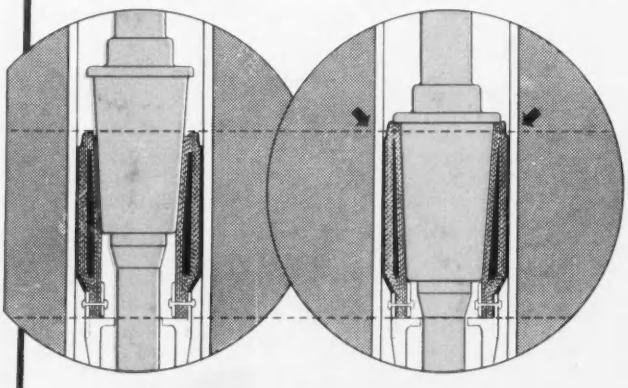


Exclusive with "American"—The packing element in this Type G Packer is designed to take advantage of modern tire fabrication principles. Examine a cut-away section of this element yourself. See how it is constructed of alternating layers of rubber—with fabric cut and placed on the *bias*, a feature which enables the element to readily return to its original shape when the cone is removed.

AND HERE'S WHY THIS "American" TYPE G PACKER makes a perfect seal with no crushing of the cup . . . .

1 —This cross-section view (in circle) shows the cone descending **into** the packing element, **expanding** the packing element horizontally against the casing as the cone moves downward

2 —Circle at far right shows the cone stopped in its final position. Note how, through the force of **lateral expansion,** the rubber has moved up (see arrows) and now forms a complete, positive seal!



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